Vol. XX. Part 3.

[Registered at the General Post Office, Melbourne, for transmission by Post as a Newspaper.]

NATIONAL MUSEUM MELBOURNE 28.3.22.

The Journal of the Department of Agriculture of Victoria, Australia.

March, 1922.

PRINCIPAL CONTENTS

Nauru and Ocean Island

Crop and Fallow Competitions

Weeds and Their Eradication

Standard Test Cows — World's Poultry Congress

Spraying Experiments for Brown Rot of Stone Fruits

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THE JOURNAL

OF

THE DEPARTMENT OF AGRICULTURE,

VICTORIA, AUSTRALIA.

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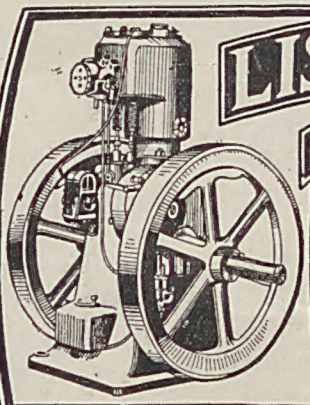

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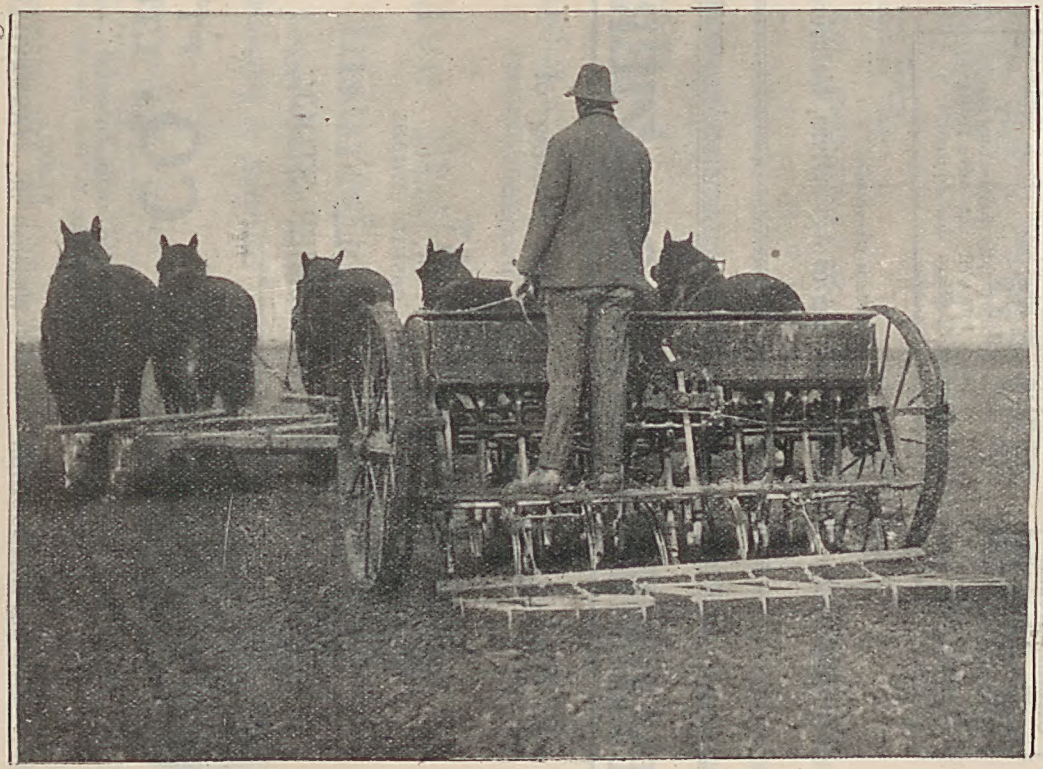

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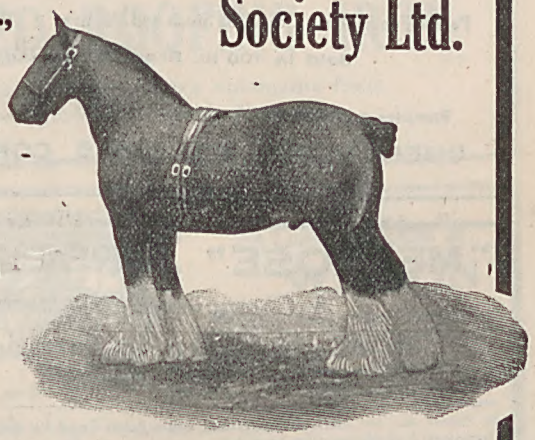

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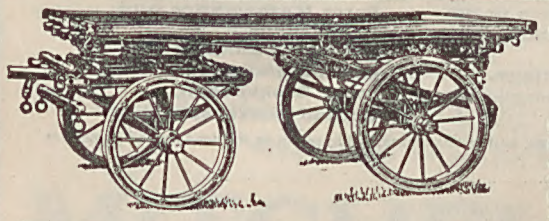

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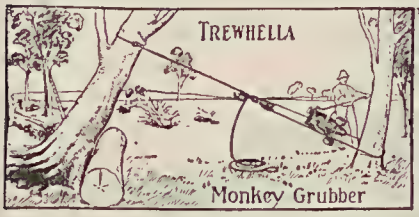

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THE JOURNAL

OF THE

Department of Agriculture

OF

VICTORIA.

Vol. XX. **March, 1922.** **Part 3.**

NAURU AND OCEAN ISLAND.

Progress under Government Ownership.

By Harold B. Pope (Commissioner for Australia).

In the August number of this *Journal* the writer gave a short history of Nauru and Ocean Island, and described briefly the nature and extent of their phosphate deposits and workings. An account of the progress made during the first eighteen months of the Commissioners' control (to 31st December, 1921) may be of interest to readers of the *Journal*.

It will be remembered that, when referring to the total annual output from the two islands, it was stated that the Pacific Phosphate Company's best year was 1913, when practically 350,000 tons were shipped. Actually the exact quantity was 338,961 tons.

The Commissioners assumed control on the 1st July, 1920, and during their first year, which ended on the 30th June, 1921, a total quantity of 364,424 tons was despatched from the two islands. It will be seen that in the first year the total shipments improved by 25,463 tons. Information now available shows that the total quantity shipped for the twelve months ended 31st December, 1921, amounted to the record figure of 394,051 tons. This is 55,090 tons more than the Pacific Phosphate Company's best year. At a glance the comparisons are therefore:—

Pacific Phosphate Co.'s record year (ended 31st December, 1913)—338,961 tons.

British Phosphate Commission's first year (1st July, 1920, to 30th June, 1921)—364,424 tons.

British Phosphate Commission's twelve months (ended 31st December, 1921)—394,051 tons.

The shipments for the last year under the Pacific Phosphate Company—1st July, 1919, to 30th June, 1920—amounted to 225,524 tons.

It was expected that the output for 1921 would reach 400,000 tons, but owing to bad weather prevailing during part of December (November-February usually constitutes the "westerly" or bad weather season) our total shipments (394,051 tons) for the year were just a little short of that quantity. The increased shipments have been made with practically the same plants, and without any increase of staff, white or coloured, on either island.

The results for the first eighteen months under the new control may be summarized as follows:—

The total quantity shipped during the eighteen months ended 31st December, 1921, was 554,656 tons, which was distributed in the following manner:—

	Tons.
To Australia	357,496
„ United Kingdom ..	32,300
„ New Zealand	29,750
„ other countries ..	135,110

As one ton of phosphate makes nearly two tons of superphosphate, after being treated and mixed with sulphuric acid, this means that something like 715,000 tons of superphosphate, made from Nauru and Ocean Island phosphate, were manufactured and used in Australia during the comparatively brief period of eighteen months. Press reports indicate that this season's wheat harvest in Australia has proved a particularly good one. It is the Commonwealth's share in Nauru and Ocean Island, resulting in increasingly large shipments of high-grade phosphate pouring into this country from those islands which, in a large measure, has made this possible. Now that we have guaranteed supplies for a great many years to come of some of the highest grade phosphate in the world, there appears to be no reason why the area under wheat should not be larger and still larger, and future harvests still more bountiful.

The indirect benefits which Australia reaps from its share in Nauru and Ocean Island are also very considerable. In addition to the large quantities of phosphate being brought to Australia by Australian-owned vessels, the discharging alone of these ships gives employment to a large number of men. One vessel—Messrs. Howard Smith's *Century*—will serve as an example. This modern cargo carrier, which is under time charter to the Commission, usually completes the round trip in six weeks. She lifts 6,550 tons and, during her discharge, which usually takes from four to five days, working day and night, employment for no less than 120 men (two gangs each 60 strong) is provided. I understand that the number of men employed by the various Australian Superphosphate Works in manufacturing, grading, and bagging, is something like 2,000. Coal shipped from Australia, and used on Nauru and Ocean Island, for the eighteen months ended 31st December, 1921, amounted to 10,000 tons, which does not, of course, include the large quantity of Newcastle coal consumed on the steamers engaged in the phosphate trade. Stores purchased by the Commission during the same period reached a value of over £300,000, of which the portion bought in Australia amounted to over £230,000, including £90,000 spent on provisions.

With the exception of the bad weather encountered in December last, the Commissioners were fortunate in that fine weather prevailed practically throughout the remainder of the year. When it is remembered that all vessels are loaded while moored to buoys about two ships' lengths from the shore, and in an unprotected open roadstead, it will be readily understood how, on Nauru and Ocean Island, we are at the mercy of the weather. Immediately the breeze shifts to the north-west, west, or south-west, the shipment of phosphate becomes impossible, and vessels at the loading berths must slip their moorings and put to sea.

For some years after operations were first commenced at the islands, wooden jetties, with a deck level of about 25 feet above the reef, were used. These only reached to and not beyond the edge of the fringing reef. During the "non-surf" days, in fine and settled weather, lighters could approach with safety the shoots at the end of those jetties and load with comparative ease, but as soon as the surf became troublesome (as it so frequently does, even in the very finest weather) the edge of the reef became a boiling cauldron. The result was that the lighters could not be held steady even for the few moments necessary to fill them with phosphate, and loading had in consequence to cease. When the present steel cantilever jetties (which give an overhang of 70, and even 80, feet) were installed, surf difficulties were largely obviated, for it follows that a lighter loading 70 or 80 feet out in the deeper and smoother water is much less hampered than one endeavouring to load in the surf at the reef edge. But, even with the present jetties, loading has to be discontinued when the surf becomes particularly heavy.

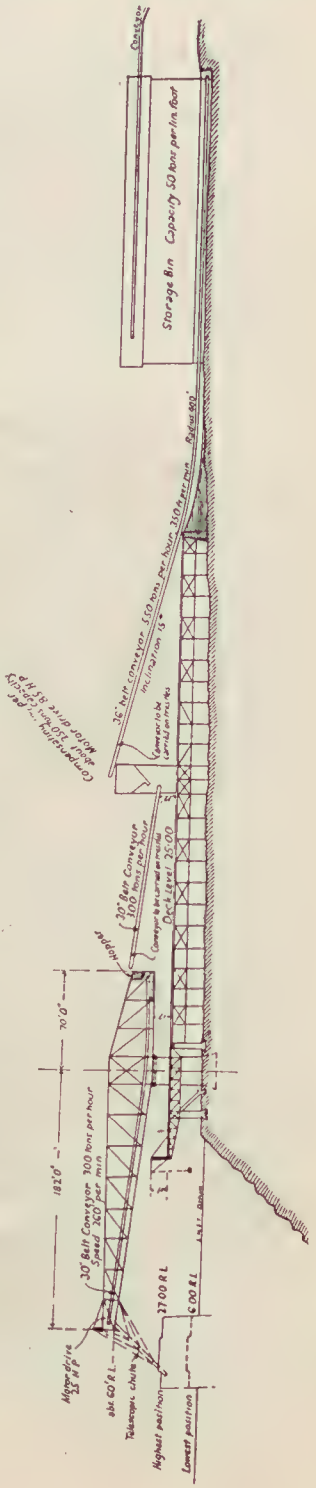
In order to make themselves as independent as possible of the weather, the Commissioners, whose combined island experience extends over nearly 60 years, intend to install at Nauru a cantilever or gantry capable of loading a 7,000 or 8,000 ton vessel in twenty-four hours. When the Nauru cantilever or gantry has proved itself a success, a similar plant will be installed at Ocean Island. Though the initial cost of the proposed erection at Nauru will be considerable, the savings effected by its successful operation will more than compensate for the outlay involved. It may be interesting to mention the methods by which these economies will be accomplished. A vessel capable of lifting, say, 8,000 tons would be loaded and despatched in twenty-four hours instead of taking a week or more to complete, as at present. Cheaper freights will thus be procurable. The labour of the "boys" employed in the lighters and launches will be saved. The boat repairing, basket repairing, and basket making gangs will be considerably reduced, if not entirely eliminated, and it is probable that the ship and jetty gangs will also be capable of reduction. The labour of all these men will then become available for raising phosphate, and the yearly output of Nauru alone (which was 241,440 tons in 1921) should considerably increase.

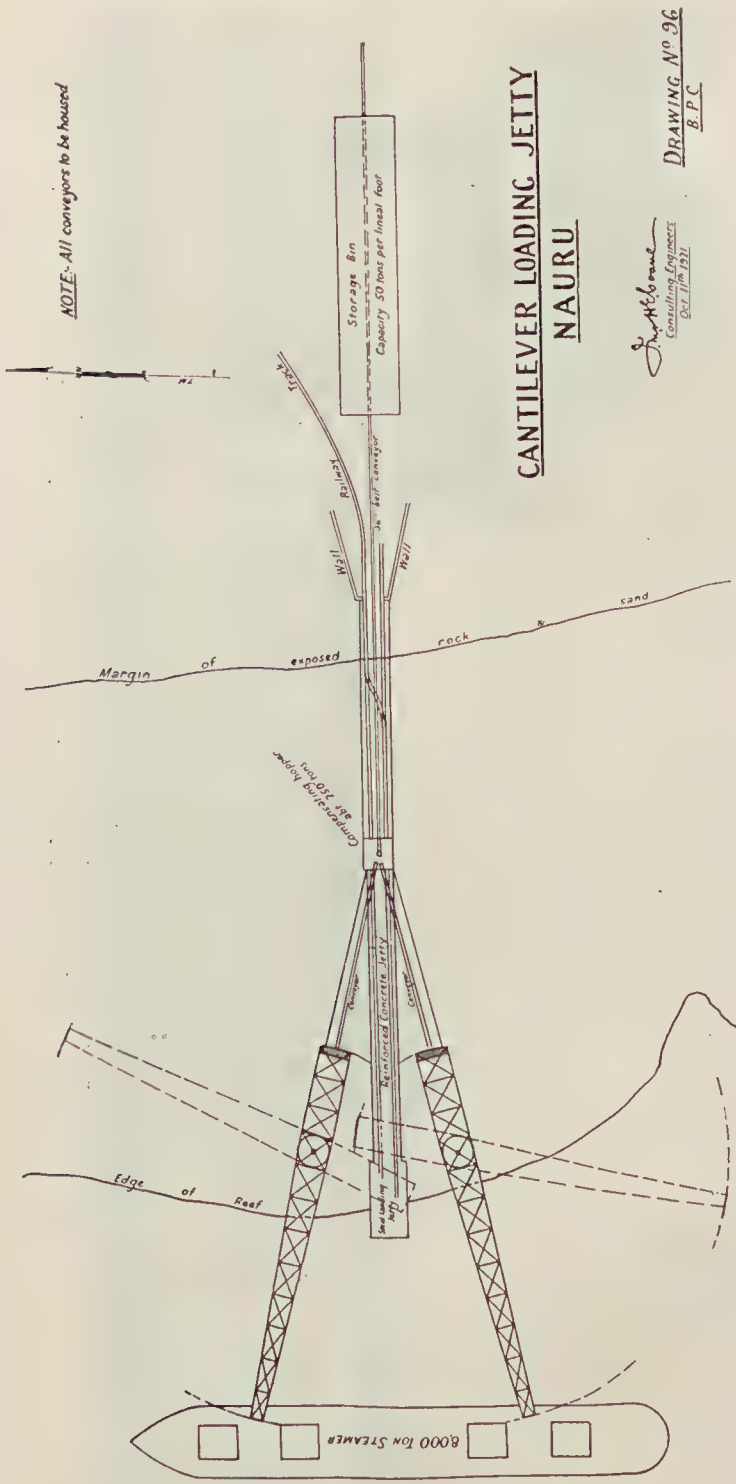
A great deal of consideration has had to be given to the advisability, or otherwise, of installing this plant. If a large steamer should collide with it, before the vessel was properly moored, it would probably result in the partial or complete destruction of the cantilever. On the other hand, should a vessel strike the reef when being warped into position, it might easily mean her total loss. The sea, surf, and wind pressure had also to be carefully taken into account. The new loading scheme

will involve the necessity of putting down specially heavy moorings to hold vessels securely in position under the cantilever arms, but this can be done. Under the present system of loading, the weather requires to be most closely watched; under the proposed new system, this will still be the case, but once a vessel comes under the gantry and commences to take in phosphate, loading operations will not cease until she has completely finished. The loaded vessel will then be either hauled to outer moorings or put to sea.

The cantilever will be Y shaped. Each arm will overhang the edge of the reef to the extent of 150 feet, the outer or seaward ends being about 60 feet above the level of the sea at high tide. Along the stem of the Y a broad rubber belt, driven by powerful electric motors, will deliver phosphate to a compensating hopper near the base of the fork, at the rate of about 500 tons per hour. From beneath the compensating hopper, which will hold about 250 tons, two smaller rubber belts, each capable of carrying 250 tons an hour, will diverge and run out on either arm. At the end of these arms will be attached a flexible shoot into which the phosphate will be delivered. One of the arms will load the Nos. 1 and 2 hatches of a steamer, and the other the Nos. 3 and 4, and, when not in use, both will be swung in-shore.

The Commission's resident engineers at the islands have drawn up plans embodying their ideas as to the type of cantilever or gantry which will be the most suitable for local conditions. The plans have been submitted to the Commission's consulting engineers, Messrs. J. M. and H. E. Coane, of Queen-street, Melbourne. Messrs. Coane, whose principals have visited the islands on several occasions in their official capacity, are thoroughly acquainted with the conditions there, also with our requirements. They have drawn up revised and improved plans and specifications. Copies of these have now been forwarded to several of the world's leading bridge builders with an invitation to tender for the installation. A reply from a leading Australian firm of constructional


Storage Bin Capacity 50 tons per ha foot
Ground line
Rock line
36" belt conveyor 500 tons per hour 300 ft per min
20" Belt Conveyor 100 tons per hour
Deck Level 25.00
Hopper
30" Belt Conveyor 700 tons per hour Speed 300 per min
27.00 R.L
6.00 R.L
Highest position
Lowest position



Preliminary Sketch of proposed new Cantilever Loading Scheme at Nauru.

S.S. "Baron Inchcape" loading a record cargo of 9,112 tons at Nauru. November, 1921.

engineers, signifying its intention of tendering for the contract, has already been received. It seems that a cantilever cannot be made, conveyed to the island, erected there and be in complete working order under two or three years, but when it is installed the Commissioners will feel that they have reduced to the absolute minimum their dependence on the weather. Should bad weather come when we have the gantry—and, of course, that is inevitable—every effort will be directed towards accumulating large stocks and filling the extra storage accommodation which is being provided for under the new scheme. Then when the fine weather returns, the waiting vessels will be loaded and despatched at the rate of one a day.

In November last the largest steamer ever dealt with at either of the two islands was loaded at Nauru. This was the *Baron Inchcape,* which loaded 9,112 tons in seven working days. Though greater care will have to be exercised, I am inclined to think that, provided the weather is fine, even these particularly large vessels will load with greater safety under our new cantilever or gantry than they do at present, whilst moored about two ships' lengths from the shore. The new moorings to be laid in connexion with the cantilever and new system of loading, will be considerably closer in-shore, and a vessel moored to them will be much less exposed to the off-shore or north-east, east, and south-east breezes, also the current. During the fine "easterly" weather, when loading is carried out, a strong equatorial current, set up by the north-east and south-east trade winds, usually runs past the island in a westerly direction. This current first strikes the island on the eastern side, and then divides into two parts, which sweep round the northern and southern shores until they meet, at some varying point, on the westward side where they unite again and continue on in a main westerly direction. Where the moorings are at present placed, a vessel lying there is frequently subjected, on account of the varying point at which the divided waters meet again, to a strong northerly or southerly "set." It is a common sight, therefore, to see a vessel at the buoy "tailing" north in the morning, and straining heavily at the moorings in a southerly direction in the afternoon. These alternate strainings, by a large and deeply laden steamer, are a very severe test on the moorings. Closer in, a steamer will be less under the influence of the off-shore breezes, also the northerly and southerly sweep of the current, and, consequently, in all probability, lie more snugly.

In June last the Commissioners received their first New Guinea labourers from the Australian Mandated Territory. These "boys" and the second contingent recruited towards the end of the year, speedily settled down and are doing well. Nauru, with its large steamers coming and going, its steam and electric locomotives, electric light, power-house, picture show, open air theatres (both European and Chinese), tennis, cricket, native brass band, &c., is proving a source of great interest to them, and they are happy and contented. I know of no place in the Pacific where coloured labourers are better housed, paid, fed, and treated, than they are on Nauru and Ocean Island.

CROP AND FALLOW COMPETITIONS, WARRACKNABEAL, 1921.

Report of the Judge, H. A. Mullett, B.Ag.Sc., Chief Field Officer, Department of Agriculture.

Herewith I have much pleasure in forwarding my awards and report for 1921 of the Annual Crop and Fallow Competition conducted by your society.

That the competition is gaining in interest at Warracknabeal is evidenced by the increased number of entries received this year—39, as against 26 last year. But it is doing more than that; it is leading to the adoption of improved farming practices in the district. The type of improvement that has taken place may be illustrated in a concrete way by a comparison between the rates of seeding and manuring that the competitors have given their crops during the past two years. In the initial competition last year it was noticed that the amount of seed

Farmers Judging Competition Field Day.—Govt. Experimental Plots, Warracknabeal.

and manure applied per acre over most of the district was considerably lower than that indicated as most profitable by Government experiments on similar soils and found satisfactory on certain private farms. Farmers at Warracknabeal were therefore urged to increase their rate of seeding to about 75 lbs. per acre on any of the stronger types of land, and the quantity of manure up to at least 112 lbs. of super. per acre on all the black land and fringe country. A statistical examination of the quantity of seed per acre used by the competitors then showed a range from 60 to 95 lbs. per acre, and that it averaged 69 lbs. per acre.

This year the seed used still showed a correspondingly wide range, but it averaged 76 lbs. per acre. That is to say, there had been an average increase in the rate of seeding of 10 lbs. per acre.

Similarly the amount of superphosphate applied last year varied from 56 lbs. up to 118 lbs. per acre. This year no competitor used less than 84 lbs. per acre. One applied 130 lbs. per acre, and the whole

averaged 100 lbs. per acre for the 21 crops inspected. The average increase was, therefore, 11 lbs. per acre.

An improvement has also been noticed in the direction of the type of fallowing adopted, and the method of working the fallows. Summer-fallowed land carefully worked has undoubtedly produced the heaviest crops in the Wimmera during the past six or seven years. That fact has been brought out by the farm competitions. The winning crop at Warracknabeal last year was a summer-fallowed one; so, too, is the winning crop this year. Whereas only a few of the fallows entered for competition last year were summer-fallowed, more than half those entered this year have been prepared in that way.

Warracknabeal Soils.

The Warracknabeal district is one of varying soil types. It is situated close to the Mallee fringe. There is land typical of the Mallee, and other soil representative of the Wimmera. The Mallee type is a

A Good Wheat Crop. (Mr. P. Leeke, Warracknabeal.)

good, sandy loam overlying a retentive clay. The Wimmera type comprises black and grey-black clay loams and red clays and loams. There are also types peculiar to the fringe country. On this latter soil the timber indigenous to the Mallee and the Wimmera intermingles. The soils on the fringe are even more free-working that those of the Wimmera. As a rule, the black Wimmera soils can be relied upon to produce the heaviest yields, with the fringe country next. The Mallee soils on the whole produce lighter crops. The red clays are refractory to work, and in wet years often give rather poor yields.

So far, no special recognition has been made of soil variation in framing the rules for the competitions at Warracknabeal. This means that competitors who farm the lighter soils labour under some disadvantage. In future it might be advisable to institute a separate class for Mallee soils.

The season was a good one, and the crops excellent. They were surprisingly free from disease. The yields in many cases have not been

quite so heavy as expected. The hot winds just after flowering time no doubt checked the free development of the grain. The red rust which made its appearance on the flag probably also played its part, and cutworms did slight damage.

Results.

Section I.—For Best 100 Acres Wheat.

(Open Competition.)

The crop awarded first prize is that of Mr. T. Pearce. This crop was grown on a fine black flat, some 236 acres in extent, at Kellalac. The variety, Federation, was very pure. The crop was quite free from weeds and rubbish underfoot. There was a little take-all and black rust present. The yield should have been heavy. Seventy-five pounds of seed per acre, obtained direct from Longerenong College, was sown, together with 112 lbs. of superphosphate. The land was summer-fallowed as follows:—In March it was disced; in winter the scarifier

Attractive Farm Residence. (Mr. A. Arnold, Warracknabeal.)

and harrows were used. These two operations were repeated in September and again in October. The paddock was then allowed to stand until the following autumn, when the fallow was re-scarified, and the seed sown with a combined drill in June.

A second entry submitted by Mr. Pearce did not appear quite so heavy in yield, but it was also an excellent crop. It was also grown on summer-fallowed land, and sown with the combined drill at the end of June and early in July. Seventy-five lbs. of seed and 112 lbs. superphosphate were used.

The second prize is awarded to Messrs. M. E. Schultz and Sons' No. 1 entry. This crop of Federation is interesting in that it is the product of seed which has been hand-selected for several years by Messrs. Schultz Bros. The yield was heavy and the crop clean. The heads of the wheat, though all of Federation, did not present so level an appearance as is desirable. That was due to the inclusion of tall variants in the wheat selected. The points deducted under the head of type were made for this reason.

The crop was grown on winter fallow. The land was ploughed in June, then harrowed in mid-August. In October it was scarified, harrowed at the end of November, and re-harrowed in March after summer rains. Finally, the paddock was scarified up and sown at the end of June. Sixty-five lbs. of wheat were used, with 84 lbs. of superphosphate per acre.

Several of the remaining crops appeared heavier than this one, but they did not score so consistently in all departments. Messrs. Lamonte Bros.' No. 1 entry was Federation wheat grown on summer fallow. Seventy-five lbs. of wheat were sown per acre, with 95 lbs. of manure. The crop was even and dense.

The 145 acres of Federation of Dookie strain shown by Mr. P. F. Lehmann, of Katyil, is worthy of notice. The bulk of the land, which is a grey-black limey flat on the fringe country, was summer fallowed. In April the disc cultivator was used, then the scarifier in July. The scarifying was repeated in September and again in November. The

A Heavy Crop of Federation. (Mr. P. F. Lehmann, Katyil.)

fallow was one of those entered for the competition last year, but in November it did not present a particularly attractive appearance. Subsequently it received the following treatment:—Harrowed in February, harrowed in March, spring-toothed in April, and finally it was sown with the combined drill and then harrowed with heavy harrows. Ninety to 96 lbs. of seed were used, and from 120 to 140 lbs. of superphosphate. The February harrowing was done when the land was dry, because the fallowing was cracking.

Mr. H. McLean's crop was a heavy one for Mallee land. Sixty acres were Penny and 40 acres Federation. Mr. McLean finds that Penny yields very successfully with him. That experience is borne out by the yields on the subsidy-experimental field at Mr. Geo. Coutts'. The crop was sown with the combined drill at the end of June. Penny does not stand quite so well as Federation, but it cannot be said to be weak in the straw.

This crop, together with that of the winner, scored highest from the point of view of purity.

Heavy crops were also shown by Mr. Geo. Clyne and Mr. F. R. Kinghorn. That of Mr. E. Parsons was good for Mallee land.

Details.

Section I.—For Best 100 Acres Wheat.

(Open Competition.)

Name.	Soil Type.	Yield.	Purity.	Disease.	Weeds.	Evenness.	Total.
Maximum Points		**35**	**20**	**15**	**15**	**15**	**100**
T. Pearce, No. 1	Black clay loam	35	19	13	14	14	95
M. E. Schultz and Sons	Loam, Mallee fringe	30	18	14	13	14	89
Lamonte Bros., No. 1	Grey-black clay loam	33	17	11	13	14	88
H. McLean	Sandy loam, Mallee	27	19	12	15	15	88
P. H. Lehmann	Black loam, Mallee fringe	31	17	13	11	15	87
E. Parsons	Sandy loam, Mallee	25	17	13	15	15	85
Geo. Clyne	Black clay loam	32	15	15	8	15	85
F. R. Kinghorn	Red loam	32	14	11	12	15	84
S. E. Kent	Black clay loam	29	17	10	14	14	84
D. Leeke	Black, red patches	26	17	14	14	13	84
T. Pearce, No. 2	Black clay loam	27	16	14	13	13	83
C. A. McKenzie	Black clay loam	25	16	9	14	14	78
T. G. Leeke	Sandy loam, Mallee	20	15	12	15	14	76
F. R. Kumnick, No. 1 entry	Red clay loam	21	19	10	12	14	76
F. R. Kumnick, No. 2	Red clay loam	22	13	13	12	12	72
Parkinson Bros.	Black clay loam, red patches	20	15	6	9	11	61

Note.—The figures for yield are not expressed in busels per acre. The actual yields are considerably above those mentioned. The differences between the yields, however, indicate the apparent differences in yield in bushels per acre.

Results.

Section II.—For Best 100 Acres of Wheat, 1921, Grown on Fallow which was Judged 1920.

Prize for Highest Aggregate of Marks Awarded for Crop and Fallow.

In this section the points for the fallows were awarded last year. The entry which secured the highest aggregate award for the crop and fallow over the two years was that of Messrs. M. E. Schultz and Sons (Entry No. 2). While this was not the heaviest crop shown in the section, nevertheless it scored consistently in the subdivisions purity, absence of disease, absence of weeds, and evenness.

It was grown on summer-fallowed land which had been thoroughly worked. Sixty-nine lbs. of seed and 93 lbs. of superphosphate were used. The sowing was made at the end of June. Federation was the variety used, and it was the product of hand selection, as in Messrs. M. E. Schultz and Sons' entry No. 1.

The second prize crop and fallow, that of Mr. W. W. Witney, was grown on the fallow that was awarded highest points last year. There

were patches of soil in the paddock containing a high percentage of limestone. On these the crop was comparatively light. Some points were lost on the score of disease.

Mr. Coutts' crop of Federation was third on the list. The paddock, Mallee fringe, was well worked, and sown at the end of June and early in July with 75 lbs. of seed and 112 lbs. of superphosphate to the acre.

The heaviest crops entered in the section were those of Messrs. F. R. Kinghorn, P. H. Lehmann, and Lamonte Bros. (No. 2 entry). The crops of the two first named were entered in the open section, and have already been described. The entry of Messrs. Lamont Bros. was a fine crop of Yandilla King and Federation. Points were deducted because of the presence of musk weed. Seventy-five lbs. of wheat with 90 lbs. of superphosphate per acre were sown. The crop was put in with a combined spring-toothed cultivator drill late in June. Yandilla King was chosen for the seeding of the part of the paddock infested with musk, because it is a tall grower and likely to assist in choking the weed. It played its part satisfactorily.

Details.

Section II.—For Best 100 Acres Wheat, 1921, Grown on Fallow Judged 1920.

Prize for Highest Aggregate in the Two Years.

Name.	Soil Type.	Yield.	Purity.	Disease.	Weeds.	Evenness.	Total for Crop.	Total for Fallow, 1920.	Grand Total.
Maximum Points ..	.. .. ..	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**200**
M. E. Schultz and Sons (No. 2)	Loam, Mallee fringe	27	18	14	15	14	88	91	179
W. W. Witney ..	Black clay loam	25	14	8	15	14	76	99	175
Geo. Coutts	Sandy loam ..	28	19	11	10	12	80	92	173
E. M. Forster ..	Reddish loam ..	22	16	8	14	15	75	96	171
Lamonte Bros. (No. 2)	Black clay loam	30	15	12	8	14	79	92	171
F. R. Kinghorn ..	Red loam ..	32	14	11	12	15	84	86	170
J. H. Gove	Red clay loam	27	16	13	10	14	80	87	167
Roy King	Black clay loam	21	16	10	12	13	72	94	166
P. H. Lehmann ..	Black clay loam	31	17	13	11	15	87	75	162
Arnold and Gove ..	Reddish loam ..	28	15	8	13	13	77	75	152

Results.

Section III.—Best 100 Acres Fallow.

In judging the fallows more difficulty than usual was experienced in arriving at decisions, owing to rains which fell a week or so prior to judging. Practically the whole of the fallows were therefore temporarily highly charged with moisture, irrespective of cultural treatment given. Reliance had therefore to be largely placed on the character of the mulch, and on the condition with respect to weeds and cultivation, in order to separate the competitors.

A fine piece of fallow entered by Messrs. Parkinson Bros. was placed first. The soil was a blackish clay loam with a few red patches. Full marks were scored practically in each subdivision. In appearance the fallow showed all the fine points of high-class workmanship. There

was a good 2½ inches of mellow mulch on top, overlying a moist, firmly consolidated seed bed. The cultivation had been done thoroughly, as evidenced by the level character of the seed bed throughout the field. The red patches were in good condition. Messrs. Parkinson Bros., who are new-comers to the district, have not been slow to profit by local experience.

The bulk of this exhibit was summer-fallowed. In the first instance the land was scarified to a depth of 3½ inches in April. Early in July it was scarified again to about 3 inches. The scarifying was repeated early in September to about 2½ inches. Subsequently a portion was

Neat Tank Stand. (Mr. W. Altman, Warracknabeal.)

spring-toothed in mid-September and the rest harrowed. The whole was then again harrowed early in October and again in mid-November. The spring-tooth was used on a portion foul with weeds prior to the final harrowing. It will be noticed that at no time was the fallow ploughed. The winter-fallowed portion was, however, ploughed.

The fallow placed second was that of Mr. Geo. Coutts. The soil was a red loam with some clay patches. Some of these were not in quite as good order as it was possible to have them, hence a slight loss on points; otherwise the fallow was perfect. The cultivation had been thorough. The land was ploughed in August and harrowed immediately afterwards. Subsequently it was scarified and harrowed in September. In November the spring-tooth cultivator was used.

Another good fallow was Mr. Altman's No. 1 entry. The only points deducted were for somewhat uneven depth of the loose surface

soil. This was summer fallow, scarified in April, re-scarified in July, again in August, again in October, and again in November. Finally the paddock was harrowed.

Mr. H. McLean's entry was sandy loam. The whole of the work had been done with the scarifier and the spring-toothed cultivator. This paddock, which is easily worked, was lightly spring-toothed in March. In July it was scarified, and later on it was spring-toothed three times—once in August, once in September, and again in October.

Useful Type of Mouse-proofed Oat Silo. (Mr. W. Altman, Warracknabeal.)

Details.

Section III.—Best 100 Acres Fallow.

Name.	Soil Type.	Moisture.	Mulch.	Weeds.	Cultivation.	Total.
Maximum Points ..	.. .. ..	**25**	**25**	**25**	**25**	**100**
Parkinson Bros. ..	Black clay loam, red patches	25	25	24	25	99
Geo. Coutts ..	Red loam ..	25	24	24	25	98
W. Altman, No. 1 ..	Red loam ..	25	24	25	23	97
H. McLean ..	Sandy loam ..	25	24	24	24	97
Geo. Clyne ..	Clay loam ..	25	24	24	22	95
W. Altman, No. 2 ..	Red loam ..	24	22	25	23	94
J. H. Gove ..	Black clay loam, red patches	24	22	24	23	93
F. R. Kinghorn ..	Reddish loam ..	25	25	21	22	93
J. McLean ..	Black loam ..	24	23	23	22	92
D. Leeke	Loam	23	24	21	23	91
A. Arnold ..	Loam	23	21	25	21	90
T. Pearce	Black clay loam ..	24	20	23	22	89
F. R. Kumnick ..	Red clay loam ..	19	18	24	19	80

Scarifier versus Plough.

Over the greater portion of the Wimmera the term fallowing implies preparation of the land with a plough and subsequent cultivation with implements of lighter draught, such as scarifier, spring-tooth, and harrows. In some instances where the soil is sufficiently loose, especially after a dry season, the plough is dispensed with and the scarifier relied on to do the heavy work. In the northern portion of the Wimmera where the soils are somewhat shallower and more easily worked than elsewhere there are numbers of farmers who are now relying entirely on the scarifier and dispensing with the plough except for occasional use. Numerous instances occur near Warracknabeal, and some have already been quoted.

There is no doubt that the practice is one saving in labour, but it is difficult to decide whether the crops are as prolific as those grown in the ordinary way.

Comfortable Farm Residence. (Mr. F. Hayter, Warracknabeal.)

One thing noticed was that fallows prepared entirely with the scarifier have, as a rule, a somewhat shallow moisture, conserving dust mulch, it being difficult to maintain the original depth, especially when the land is well sheeped. But notwithstanding that, two of the three best fallows in this competition were prepared without the aid of the plough. Of course, on land where weeds are vigorous, the plough must be resorted to.

Next year the crops grown on these variously treated fallows at Warracknabeal will afford interesting comparisons.

Drilling.

There can be no question of the rapid increase in the number of drills of the combined cultivator type in the Wimmera. Hundreds of them have been placed in use there since 1917. Their popularity is accounted for by the fact that the final cultivation of the fallow and

the seeding of the crop can be done by one man in one operation. Of course, if the land is very foul with weeds, the scarifier must be used as well. Originally there was some doubt as to whether crops as clean and as heavy as those grown in the ordinary way could be produced. But that point is now definitely settled, and it has even been argued that better crops may be grown. It is said that this is because the combined drill sows the grain on the firm soil underneath the loose mulch. This point, however, cannot be settled without careful test, but it is a fact that some of the heaviest crops in the farm competitions during the past few years have been sown with the combined drill.

An older variation of the type of drill mentioned is the "box" plough—a grain distributer fitted to a skim plough. This, however, is not extensively used.

Numbers of farmers are using the cultivator part of the first mentioned drill to work up their fallows. The winning crop in the soldiers' section of the Beulah Competition was so treated.

Farmers' Field Day. (Govt. Experimental Plots, Warracknabeal.)

Working the Fallow when Dry.

It is the common experience of Wimmera farmers to find that if the fallowed land is worked over with heavy implements when it is dry, it afterwards becomes difficult to consolidate properly, and that the "take-all" disease may appear when the crop is sown. Dry-working is, therefore, scrupulously avoided, and the ground rarely touched until it is in a moist condition. But it frequently happens, especially on fallows well tramped with sheep, that the soil cracks badly in summer, and, consequently, loses moisture. Farmers are, therefore, in a dilemna; shall they harrow the fallow in the dry state, and close the cracks, or shall they wait for rain? Two cases can be quoted where the land cracked in the summer last year, and where a light harrowing was given without any ill-effects. Indeed, the harrowing was probably of great benefit to the subsequent crop.

Mr. Walter E. Dahlenburg, of Nhill, had a paddock of his fallowed land crack badly, and he decided to harrow it. The crop was a very heavy one, and showed no signs of "take-all." Similarly, Mr. P. H.

Lehmann, of Katyil, harrowed his fallow dry, and the crop suffered no ill effects, indeed, it was, apparently, considerably benefited.

It would appear then that, at any rate, light implements may be used on fallows in a dry state to prevent cracking, with benefit to the subsequent crop.

A Fine Orchard.

A report of the Warracknabeal district would not be complete without reference to a fine orchard attached to the wheat farm of Mr. F. Hayter. There are 2 acres of well-grown fruit trees, consisting of

A Productive Citrus Grove. (Mr. F. Hayter, Warracknabeal.)

oranges (Washington Navel do best), vines, and soft fruits. The orchard has rarely received artificial watering, yet the trees show vigorous unchecked growth, and bear as well as those in recognised fruit-growing districts. The soil is loamy. It is probable that the orchard receives some drainage water from the surrounding country, but, undoubtedly, the thorough cultivation given is of great assistance in reducing evaporation to the minimum.

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In conclusion, I desire to thank the Secretary, Mr. W. Candy, the President, Mr. F. Hayter, and members of the society for their cordial assistance and co-operation during the work of judging.

NHILL CROP AND FALLOW COMPETITION.

Report of the Judge, I. M. Tulloh, Field Officer, Department of Agriculture.

Since the inauguration twenty years ago of farm crops and fallow competitions by the Nhill Agricultural and Pastoral Society, the position of Secretary has been filled by Mr. C. H. Towns, and it must be very gratifying to him and the officers of the society to note the increasing interest taken year by year in these competitions. A record number of entries was received last year, and the number of entrants during this season exceeded last year's total by six. Further, the growing keenness of competitors, and their general adoption of the soundest methods, is resulting in a large number of entries of high standard being offered for inspection.

The Season.

The season has been an exceptionally favorable one. The rainfall for the year, 13.10 inches up to the end of November, though below the average, was notable for its opportune distribution. Crops grown on summer fallow had roughly 20 inches of rain during the fallow period, and on winter fallow 16 inches, while approximately 8½ inches fell during the growing period of the crop. The mild temperatures during early winter enabled crops to get a good start. Favorable growing weather prevailed right through the season, and the cool spell in early December should result in the grain filling well.

Close muggy weather in November caused rust to make headway in many crops. This, however, was fortunately checked by more seasonable weather before the fungus had affected crops to any serious extent.

Results.

Section 1A.—Best Worked and Managed Farm of an Area over 100 Acres.

(Judged on a scale of points furnished by the society.)

There were three competitors in this section, *i.e.*, Messrs. C. H. Roediger, Julus Reichelt, and O. H. Lienert, and the points were awarded as follows:—

Name of Competitor.	Cropping System, Cultivation, Rotation, and Manure.	Crops, including Wheat and Oats.	Fallow.	Horses.	Sheep.	Cattle.	Pigs.	Poultry.	Equipment, Machinery, Implements.	Boundary and Subdivision Fences, Gates, and Sheep Yards.	Orchard and Vegetable Garden.	Water Storage, Accessibility to Stock, Ease of Watering, and Location.	Dwelling and Outbuildings.	Reserve of Fodder.	Tree-planting.	Farm and Stock Insurance.	Total.
Maximum Points	**35**	**20**	**20**	**25**	**20**	**10**	**5**	**5**	**20**	**20**	**10**	**45**	**20**	**20**	**5**	**5**	**285**
C. H. Roediger	32	15	15	17	17	3	2	4	19	17	4	43	17	16	4	4	229
Julus Reichelt	30	14	17	24	7	9	4	3	20	14	7	30	15	15	3	2	214
O. H. Lienert ..	29	14	13	17	20	6	3	4	19	12	6	33	12	14	2	2	206

The winner, Mr. C. H. Roediger, had a very complete farm, with a total area of 1,000 acres. Of this, 200 acres were sown with wheat, 190 acres with oats (40 acres in fallow), and 20 acres with barley, while 5 acres had been put in with Sudan grass as summer pickings for the milking cows and occasionally for other stock. There were 280 acres of well-kept fallow. The rotation practised is the four-year one:—Fallow, wheat, oats, pasture. Ploughing is done to a depth of from 3½ to 4 inches on the black land, and lighter on the red soil, of which there are several paddocks.

Mr. Roediger has a very complete equipment of farm implements and machinery, all of which was in a good state of repair. The farm is subdivided into useful-sized paddocks, and care has been taken to give easy access from one field to another. All gateways are 16 feet wide, closed with two 8-ft. gates, which were in good order and well hung.

One of the outstanding features was the complete watering system. At a depth from 75 to 100 feet, an abundant supply of water is obtained. Two wells 100 feet deep have been put down—one at the homestead, and another conveniently situated to serve the more distant paddocks. The water from these is raised by wind-mills to overhead tanks—one with a capacity of 3,000 gallons, and another of 2,000 gallons. From these an extensive system of water-pipes has been laid to troughs which serve every paddock on the farm. To prevent corrosion, these troughs, which are of galvanized iron, have been packed inside with cement. This water has been found unsuitable for the garden, and a supply for this purpose is obtained from a 2,000-yard dam near by—also provided with a wind-mill.

Rain water, for which there is a storage capacity of 6,000 gallons, is laid on to the house; while convenient taps have been placed at the sheep-dip, and other points around the out-buildings.

A fine avenue of sugar gums leads up to the homestead, while others have been planted in suitable positions around the farm buildings. The dwelling, which is surrounded by a large and neatly-kept garden, is artistically designed, and is supplied with acetylene gas, and has a large semi-detached cellar 20 feet by 10 feet.

The farm buildings are compactly arranged, and are of a very serviceable type. They comprise a 16-stall stable and two loose-boxes. Included in the stable building are the engine-room and chaff house, from which the chaff is wheeled in a large barrow down a passage, whence it is fed into the feed boxes. The barrow is built large enough to hold enough chaff for one feeding up.

At the end of the stables, under the same roof, is the shearing-shed, fitted with two stands, with the necessary yards, drafting pens, and dip attached.

There is a large roomy implement shed, a galvanized-iron barn 32 feet by 26 feet, with a solid boarded floor. On one end of the barn, two oat bins have been built, each with a capacity of 500 bags. These are filled each year, and held in reserve until the succeeding oat crop is assured, when they are emptied, and the oats sold and replaced by the new season's grain.

Near the barn, a fine buggy shed has been built, with wide sliding doors at each end. In addition, there is a well-equipped blacksmith's shop—a necessary adjunct to every farm.

A disused stripper, and old iron tanks, have been converted into mouseproof store-boxes, in which are kept canvasses, bags, rugs, &c.

In addition to the oats mentioned above, Mr. Roediger has, as a reserve, 100 tons of oaten hay, 20 tons of oaten straw, and 10 tons of self-sown hay. The oaten hay was stored in two 50-ton mouseproof stacks.

The homestead, farm buildings, stationary machinery, and crops, are covered by insurance.

Mr. Roediger is to be congratulated on the appearance of his farm, of which the whole tone is characterized by the old maxim "A right place for everything, and everything in its place."

On Mr. Reichelt's farm of 960 acres, 240 acres had been sown with wheat, 40 acres with oats, and 400 acres were in fallow. The practice

Neat Buggy Shed and Barn. (Mr. C. H. Roediger.)

here is to crop practically half the farm each year—a two-year rotation, "fallow and wheat."

Fallowing for this season's crop had to be considerably curtailed, as at the time of ploughing over 800 sheep were being carried, and the land had to be left in grass; so that only a little more than half the usual area of wheat is being grown this year. On this there was a well-grown crop of Federation, but it contained a number of wild oats, especially in one of the paddocks. The fallow was in splendid order, the exception being a few red patches, which had evidently been caught at a difficult time, and consequently did not work down satisfactorily.

The equipment of implements and machinery was very complete.

Mr. Reichelt believes in quick cultural operations, and to accomplish this uses wide-cutting implements and large teams. The spring-tooth is used in preference to the harrows for lighter workings on the fallow. Two of these implements (each 7 ft. 6 in.) are attached to a 12-horse

bar—one slightly in advance of the other—and, controlled by one driver, work very satisfactorily.

Many handy home-made devices were noticed on the farm.

A good permanent water supply is obtained from a 76-ft. well, fitted with a wind-mill, and a 7,000-gallon overhead tank. For household use the rain water is stored in a 21,000-gallon cement underground tank. It is pumped from here to an overhead tank, from which pipes are laid to convenient places throughout the dwelling.

Mr. Reichelt's home is an acquisition to the district. Built of cement concrete (4 parts stone, 3 sand, and 1 cement), with a tiled roof. it contains eleven large and conveniently-arranged rooms, with lofty walls, and is surrounded by a broad verandah. An extensive garden has been tastily laid out around it, and has been planted with decorative shrubs at the front and sides, while the remainder contains 100 young fruit trees, and a well-stocked vegetable garden. The whole homestead is surrounded by a shelter-belt of sugar gums.

An Attractive Home. (Mr. O. H. Lienert, Lorquon.)

The stables, however, are not well improved, and the chaff-cutter and chaff-house are not conveniently situated. The reserve of fodder comprised two stacks of hay (160 tons), and a stack of wheaten straw, and 80 bags of oats stored in a tank oat bin.

All crops, stables, and stationary machinery were insured.

On Mr. Lienert's farm of 880 acres, 300 acres were under wheat, 70 acres under oats, and 40 acres under barley, while there were 170 acres of fallow. The wheat crop was mainly Yandilla King and Federation, with a smaller area of Dollar. Taking into consideration the lighter nature of some of the land, the crops were very creditable.

Mr. Lienert has recently introduced a merino stud, and, in addition, is carrying upwards of 400 merino sheep.

As on the two previous farms, a very complete set of farm machinery was met with.

A large implement shed, 80 feet by 20 feet, comfortably housed all implements requiring protection from the weather. Included in the out-buildings, also, are an up-to-date shearing shed, with three stands, and very complete yards attached; a good serviceable barn; a nicely modelled motor and buggy shed; and a well-stocked blacksmith's shop. The stables, however, are not up to date, and the farm buildings are rather scattered.

Mr. Lienert has in reserve 120 tons of hay, 100 tons of which are of wheat, and 20 of oats. An oat bin, which holds 500 bags, contained at the time 80 bags, a large quantity having been used during the season.

The house and all crops were covered by insurance.

One of the outstanding features on these farms was the large and complete stock of implements and machinery carried, and one might be justified in questioning whether the areas of the farms admitted such

Mr. C. P. Dahlenburg's Winning Crop of Federation.

a large outlay of capital in this direction. It will be seen by the award of points that on each of the farms there were features of outstanding merit. The winner, Mr. Roediger, however, scored consistently well in nearly all departments, but he lost points for cattle, pigs, and orchard—which latter had been destroyed by opossums.

Section 1.—Best Exhibited Half of Farmer's Wheat Crop, not Less than 75 Acres.

There were fifteen competitors in this section, and all the crops shown were exceptionally good. The two leading crops, both of Federation, that of Mr. C. P. Dahlenburg (the winner) and that of Mr. Robert Blackwood (who secured second place), were the finest I have ever seen. Both were awarded the maximum points for yield. Mr. Blackwood gained a point for purity, and another for freedom from disease. Mr. Dahlenburg, however, led by two points for freedom from weeds, and gained another in evenness, giving a total of 93; thus winning from Mr. Blackwood by one point.

Mr. Blackwood's crop, sown early (latter end of May), was tall, and stood erect. It was very dense, and exceptionally well headed. Mr. C. P. Dahlenburg's crop was sown a month later, and consequently was much shorter. Like Mr. Blackwood's, it was very dense, and beautifully headed, while the whole field presented a practically level surface, solidly packed, and almost entirely free from weeds.

Mr. W. E. Dahlenburg's crop was of Federation and Dollar. This also was a splendid crop, and very free from foreign varieties.

Worthy of special mention was the crop exhibited by Mr. C. F. Reichelt, whose land is considerably lighter than that of the leading competitors. Yet this crop was placed only three points behind the winning one. It will be seen that, though not such a heavy yielder, this crop scored exceedingly well on other points.

As stated previously, all the crops in this section were exceptionally fine. Those of Mr. A. W. Goodwin and Mr. Peter Bone, jun., were especially good.

Award of Points.—Section 1.

Name.	Yield.	Purity.	Freedom from Disease.	Freedom from Weeds.	Even-ness.	Total.
Maximum Points	**40**	**20**	**15**	**15**	**10**	**100**
C. P. Dahlenburg (Winniam East)	40	16	13	14	10	93
Robert Blackwood (Kiata East) ..	40	17	14	12	9	92
W. E. Dahlenburg (Salisbury) ..	37	18	13	13	9	90
C. F. Reichelt (Lorquon West) ..	36	18	14	13	9	90
A. W. Goodwin (Kaniva) ..	37	18	12	13	9	89
Peter Bone, jun. (Kiata East) ..	35	18	14	13	9	89
A. G. Dahlenburg (Winniam East)	37	16	11	14	9	87
Julus Reichelt (Lorquon) ..	33	16	14	12	8	83
A. E. Bond and B. Hegarty (Yanac)	35	17	11	12	7	82
James Moulden (Kiata)	35	17	12	11	7	82
Johan Reichelt (Lorquon) ..	34	17	13	11	7	82
Alfred Wohlers (Winniam) ..	35	16	10	12	8	81
J. B. Marshall (Lorquon) ..	34	17	10	12	8	81
Creek Bros. (Winniam)	32	16	11	12	8	79
O. H. Lienert (Lorquon) ..	33	13	13	12	8	79

Mr. C. P. Dahlenburg's crop was grown on fallow which had been very thoroughly worked. A part had been summer fallowed, and the remainder winter fallowed. The summer fallow was ploughed in March, and scarified during the second week of July. The winter fallow was ploughed at the latter end of July, and harrowed four days later. It was all then given the following treatment:—Worked with the combine during the second week of October, and then crossed; again worked with the combine and crossed early in November; harrowed a week later, and again in March. With the harrows working a day or so behind, it was put in with the combine during the third week of June; 75 lbs. of seed, and 120 lbs. of manure were sown per acre.

Mr. Blackwood fallowed his paddock during February and March. The next working was in June, when it was scarified 3 inches deep. It was then spring-toothed across in September, and crossed again in October, and harrowed after rain in November. With the cultivator working ahead of the combine, it was sown with 75 lbs. of seed and 112

lbs. of manure during the last week of May—a team of harrows working close behind.

A further discussion of the crops in this section appears in Section 8.

Section 2.—Best Crop of 100 Acres on Mallee Land—Fringe Land Debarred.

Name.	Yield.	Purity.	Freedom from Disease.	Freedom from Weeds.	Even-ness.	Total.
Maximum Points	**40**	**20**	**15**	**15**	**10**	**100**
C. F. Reichelt (Woorak West) ..	30	16	13	14	8	81
J. B. Marshall (Lorquon) ..	29	16	13	13	8	79
F. W. Reichelt (Allanby) ..	32	15	9	10	8	74

Crop of Penny. (Mr. R. Blackwood.)

Mr. C. F. Reichelt's crop of Federation was grown on sloping land along the edge of a water-course. Heavy rain after seeding caused the grain to burst, and 60 acres had to be re-sown. The crop was very free from weeds, and was exceptionally well headed. Ploughing was done in early winter, and the ground was sparingly worked with the spring-tooth during the spring, care being taken not to work the surface too finely. It was spring-toothed again after an inch of rain in February. Sixty pounds of seed and 80 lbs. of manure per acre were put in with the combine at the latter end of May, and harrowed four days later. When re-sowing 60 acres, a further 36 lbs. of super-phosphate per acre was allowed. Except for several patches which had been thinned owing to water soakage from the higher slopes, the crop was dense for this class of soil.

Mr. Marshall's crop, also of Federation, was grown on land which had been ploughed during July and harrowed immediately after. It was then left untouched till March, when it was cultivated with the

spring-tooth, and after a germination of weeds in April, it was crossed with the same implements. It was drilled with a combine early in May, sowing 75 lbs. of seed and 80 lbs. of manure per acre. About 17 acres were put in on the first day's sowing, after which the work was held up for a week owing to heavy rains. There was a difference of approximately a bag per acre in favour of the first day's sowing. The whole crop was nicely grown, and fairly free from weeds, while the only diseases in evidence were flag smut and a little rust.

Mr. T. W. Reichelt's crop was heavier than either of the two preceeding ones, but points were lost on account of the presence of weeds, while stinking and flag smuts were prevalent. This crop was sown at the end of June—considerably later than the other two, and heavier quantities of seed and manure were used—63 lbs. and 90 lbs. respectively per acre.

Section 3.—Best Black Fallowed Land, not Less than 100 Acres.

(All competitors' fallow to be shown.)

There was again a large field of competitors in this section, *i.e.*, 13, and of this number, 11 were awarded points from 93 upwards. From this it will be gathered that the fallows were exceptionally even, and of a high standard.

The task of separating them was made more difficult by the occurrence of heavy rain during the judging week. This was very unevenly distributed over the district, and greatly interfered with the tests for moisture, so much so that it was found necessary to award all the fallows the maximum points in this respect. Thus no competitor gained any advantage over another whose fallow may have been inspected before the rain commenced, or where less rain had fallen. In awarding points for the various fallows, a number of which were well nigh perfect, points had necessarily to be deducted for the smallest details.

Award of Points.—Section 3.

Name.	Moisture.	Mulch.	Freedom from Weeds.	Consolidation.	Cultivation.	Total.
Maximum Points	**20**	**20**	**20**	**20**	**20**	**100**
W. E. Dahlenburg (Salisbury) ..	20	19	20	19	20	98
Petes Bone, jun. (Kiata East) ..	20	20	18	19	19	96
H. E. Dahlenburg (Winniam East)	20	20	20	18	18	96
R. Blackwood (Kiata East) ..	20	19	20	18	19	96
Julus Reichelt (Lorquon) ..	20	19	19	19	19	96
C. F. Reichelt (Woorak East) ..	20	19	18	19	19	95
C. P. Dahlenburg (Winniam East)	20	19	20	18	18	95
Johan Reichelt (Lorquon) ..	20	17	20	19	18	94
A. G. Dahlenburg (Winniam East)	20	19	17	19	18	93
A. W. Goodwin (Kaniva) ..	20	18	18	18	19	93
O. H. Lienert (Lorquon) ..	20	16	14	16	15	81
F. W. Reichelt (Allanby) ..	20	16	11	16	16	79
James Moulden (Kiata) ..	Withd	rawn.				

The winner, Mr. W. E. Dahlenburg, showed a fallow that was practically perfect. One half of this had been summer fallowed, and the other half winter fallowed. The summer fallow had been ploughed

in March, scarified early in July, and again in September. It had received three harrowings—one in October, the next in November, and the last after a heavy rain just prior to judging. The winter fallow was ploughed in July, and harrowed early in August, a week after ploughing. It was scarified in early September, and had been harrowed at the end of September, and received two more harrowings at the same time as the summer fallow.

There was no apparent difference between the summer and winter fallow, all of which was in beautiful condition. The underlayers were well consolidated, and contained abundant moisture, while the mulch was in fine tilth, and weeds were entirely absent.

Harrowing after the heavy rains early in December was an asset to this fallow. Mr. Dahlenburg seized the opportunity of doing this while hay-making was held up through unfavorable weather, and thus prevented the mulch from settling down—a feature which was noticeable on a number of fallows on which heavy rain had fallen.

Mr. Bone's fallow was ploughed in March, and scarified during the second week of July. It was worked again with the same implement at the middle of August, cultivated in September, and again in October. The mulch in this fallow was in perfect condition, very regular in depth, and worked to a very even tilth. Points were lost owing to the presence of young "paddy melons," which, though their growth here may be attributed to the moist condition of the fallow, must at the same time be regarded as an exceedingly troublesome weed.

A portion of Mr. H. E. Dahlenburg's fallow was ploughed in March and the remainder early in August. The summer fallow was harrowed immediately after ploughing. It was then scarified in July, and harrowed a week later. This treatment was repeated in September, and again in November. The winter fallow was harrowed and cross-harrowed immediately after ploughing. It was treated similarly to the summer fallow in September and November, but received an extra harrowing at the end of the latter month.

Like Mr. Bone's fallow, the mulch was very evenly put on to a depth of 2½ inches. About 30 acres, however, had been flattened by a heavy rain storm, and would have benefited by harrowing.

Mr. Blackwood showed all summer fallow, of which there were 335 acres. The 100 acres entered in this section had to be re-ploughed at the beginning of August owing to the strong growth of weeds, attributed to the fact that two oat crops had been grown in this paddock in succession, previous to ploughing. Immediately after re-ploughing, during which it had been harrowed with a harrow-leaf attached to the plough, it was cross scarified. It was then harrowed, and cultivated with the spring-tooth early in November. This fallow was free from weeds, but showed variations in consolidation.

Mr. Jules Reichelt's fallow was ploughed in August, then harrowed three times at short intervals, crossing the previous working each time. It was rolled and then cultivated during October, one half was then rolled again, when it was all re-cultivated. This was an exceedingly good fallow, scoring very consistently under all heads, for which points were awarded.

Mr. F. W. Reichelt was unfortunate in having a severe illness, which prevented him from working his fallow; while Mr. Lienert lost points

mainly through the presence of large patches of a weed of the Solanum family; it had a thorough hold of the fallow.

Section 4.—The Best Red Fallowed Land, not Less than 100 Acres.

(All competitors' fallow land to be shown.)

There are a large number of farms throughout the district which include a big proportion of red land. This is considered the most difficult class of land that wheat-growers have to contend with, and from the time of fallowing until the crop is well above ground, it causes many anxieties to the farmer.

Ploughing is the greatest difficulty, and the success here is mainly dependable on the season. If the soil is too wet at the time of ploughing, the sods set into hard lumps, which defy future attempts at breaking them down. During a prolonged winter, fallowing has to be postponed until the land is dry enough to get on to. This invariably means a short fallowing season, for the warm spring days quickly evaporate the moisture, and the ground sets into such a cementy state that the plough will scarcely touch it. Even when fallowing is carried out under favorable conditions, it is necessary to have a drag-harrow attached, or to follow the plough closely with the harrow, so that the sods may be somewhat broken down before drying out.

The winner in this section was C. P. Dahlenburg, with C. H. Roediger 2nd, and C. F. Reichelt 3rd.

Details of points awarded are as follow:—

Award of Points.—Section 4.

Name.	Moisture.	Mulch.	Freedom from Weeds.	Cultivation.	Total.
Maximum Points ..	**25**	**25**	**25**	**25**	**100**
C. P. Dahlenburg ..	25	18	24	20	87
C. H. Roediger	25	18	24	19	86
C. F. Reichelt	25	17	17	16	75

Mr. Dahlenburg had fallowed during early July, with a harrow-leaf attached to the plough. The paddock was then cross-harrowed, and scarified at the latter end of August, and then fallowed again with the harrows. It was given a working with the combine in early October, and cross-harrowed at the end of the month. The fallow was very free from weeds, but the surface in many places had been broken down too finely, thus leaving it liable to be set down by heavy rain. A portion of sloping ground had been left with the combine surface, and in districts where red soil preponderates, such treatment is found most suitable for this class of soil. The ridges left by the tynes of the combine or the cultivator prevent the settling of the surface, and even after heavy rains the caps of the ridges can be worked across in the autumn, and an efficient seed-bed obtained.

Section 5.—Best Wheat Crop Grown on Fallow Land, the Fallow to be Judged on Points 1920, and the Crop Grown on this Fallow in 1921.

The details of the points awarded to the fallows were issued in the report of the Crop and Fallow Competitions 1920, while the points awarded for the crops are detailed in Section 1, with the exception of Mr. C. H. Roediger's, to which the points allotted were:—Yield, 34; purity, 16; freedom from weeds, 14; freedom from disease, 12; evenness, 8. Total, 84.

Totals, Fallow 1920, and Crop 1921.

Name.	Fallow 1920.	Crop 1921.	Total.
Maximum Points	**100**	**100**	**200**
Robert Blackwood	98	92	190
W. E. Dahlenburg	99	90	189
C. P. Dahlenburg	94	93	187
A. G. Dahlenburg	96	87	183
A. W. Goodwin	91	89	180
Peter Bone, jun.	87	89	176
James Moulden	94	82	176
O. H. Lienert	92	79	171
C. H. Roediger	85	84	169
Crouch Bros.	90	Withdrawn	..

This section was very evenly contested. Though Mr. W. E. Dahlenburg led by one point on last year's fallows, Mr. Blackwood's splendid crop enabled him to win on the aggregate by one point; while Mr. C. P. Dahlenburg was very close up in the third place.

Section 6.—The Whole of Farmers' Fallow 1921, the Crop on that Fallow 1922, Fallow 1922, and Crop 1923.

Name.	Moisture.	Mulch.	Freedom from Weeds.	Consolidation.	Cultivation.	Total.
Maximum Points	**20**	**20**	**20**	**20**	**20**	**100**
W. E. Dahlenburg	20	18	20	19	19	96
Robert Blackwood	20	19	19	18	19	95
C. F. Reichelt	20	19	18	19	19	95
C. P. Dahlenburg	20	19	20	18	18	95
Julus Reichelt	20	18	18	19	19	94
Peter Bone, jun.	20	19	17	19	18	93
H. E. Dahlenburg	20	19	17	18	18	92
A. W. Goodwin	20	17	18	18	19	92
O. H. Lienert	20	17	17	17	17	88

Mr. W. E. Dahlenburg's fallow totalled 290 acres, 100 acres of which were summer fallow, and the remainder winter fallow. The summer fallow had received the same treatment as that outlined in

Section 3; the balance of the winter fallow had been ploughed in July, harrowed in early August, cultivated in September and again in October, and harrowed in November, after a good fall of rain. Included in this was a number of red patches which had been well broken down without becoming too fine. The whole of this fallow was free from weeds and in splendid order, while a notable feature is that Mr. Dahlenburg worked the whole area with only one team.

Mr. Blackwood's fallow of 335 acres had all been summer fallowed, with the exception of a patch of red ground of 25 acres, which was too hard to plough before the winter rains. The working of 100 acres has been detailed under Section 3. The remainder, after ploughing in April with a harrow-leaf attached to the plough, was scarified early in July, crossed with the spring-tooth three weeks later, again scarified during the middle of September, and spring-toothed in early November. Every acre of this extensive fallow had been worked with equal thoroughness. There were, however, variations in the degree of consolidation in the underlayers.

Mr. C. F. Reichelt had worked his fallow very thoroughly. Ploughing had been done during the first three weeks of July. It was then harrowed and cross-harrowed within a fortnight, when the following workings were given:—Spring-toothed in early August, and again at the end of the month, crossed with the same implement again at the latter part of September. It was then rolled and spring-toothed at the end of October. This fallow included a proportion of red ground which had been given special attention and brought into nice condition.

Section 7.—Best Wheat Crop Grown on Red Fallowed Land, not Less than 75 Acres.

There were but two entries in this section—Messrs. C. H. Roediger and Paul Staher.

Name.	Yield.	Purity.	Areedom from Disease.	Freedom from Weeds.	Even-ness.	Total.
Maximum Points	**40**	**20**	**15**	**15**	**10**	**100**
Paul Staher	30	16	13	12	7	78
C. H. Roediger	30	17	10	12	8	77

The award of points shows that the contest was very even. Mr. Roediger gained a point on the absence of foreign varieties, but the presence of smut was mainly responsible for the loss of five points, and enabled Mr. Staher to win by one point.

Mr. Staher's crop was of Federation and Dollar, and was grown on a sloping red hill, inclined to be loamy in patches, and heavier on the lower slopes. It had been fallowed during July, harrowed and spring-toothed twice before harvest, harrowed after a heavy rain at the latter end of February. It was scarified in front of the drill during the middle of June, and harrowed and cross-harrowed immediately after. Eighty pounds of seed, and 112 lbs. of manure were sown per acre.

Mr. Staher believes in heavy sowings of both seed and manure on this class of land, and the tests which he has made this season strongly support his opinion.

A round of the drill was sown through the middle of his paddock with only ½ cwt. of superphosphate per acre. The crop here is much thinner, and by appearance several bags per acre lighter in yield than the remainder of the crop; while tests with different rates of seeding showed a marked difference in favour of the heavier sowings.

Mr. Roediger's entry consisted of three varieties:—Yandilla King, Penny, and Gallipoli. The seed of the two first varieties had been raised by Mr. Roediger, who selected 15 lbs. of seed of each from his crops three years ago. Typical heads of each variety had been selected and threshed out, and sown on small areas the first season.

This method of selecting seed is one which is easily applied, and from which very beneficial results were obtained by competitors in a

Oat Silo, built by Mr. J. B. Marshall, Lorquon, at a cost of £65.
(Holding 600 bags.)

"Selected Seed Competition," conducted by the Horsham Agricultural and Pastoral Society, in the seasons 1917-1919.

Section 8.—Whole of Farmer's Fallow 1920, Crop 1921, Fallow 1921, and Crop 1922.

The test in this section, spread over three years, is a severe one, but must be regarded as probably the most educational competition on the society's schedule.

In favorable seasons, exceptionally heavy crops are occasionally grown on poor fallows, while in seasons with unusual weather conditions, a crop which had received indifferent treatment may win a prize. The competitions are conducted for their educational value, and the aim here is to circulate the methods by which the best crops are grown over a number of seasons. Hence, a summary of the cropping systems of the leading competitors in this section, taken after several of these

competitions have run their course, should prove of beneficial interest to all wheat-growers throughout the district.

The fallows of 1920 have been discussed in the report of that year, and those for 1921 are detailed under Section 6, excepting those of Messrs. C. H. Roediger and Johan Reichelt, to whom the following points were awarded (Mr. Reichelt's awards are placed first) :—Moisture, 20, 20; mulch, 17, 16; freedom from weeds, 20, 17; consolidation, 18, 16; cultivation, 19, 17. Totals: Mr. Reichelt, 94; Mr. Roediger, 86.

Mr. Reichelt's fallow was in splendid condition. It included a number of red patches, which had been specially catered for, and had been brought into nice order. Mr. Roediger's fallow contained some low-lying patches, which had presented many difficulties in working.

This section will be completed with the judging of the crops next year.

The positions of competitors are:—

Crop 1921.

Name.	Fallow.		Yield.	Purity.	Freedom from Disease.	Freedom from Weeds.	Evenness.	Crop Total.	Total.
	1920	1921.							
Maximum Points	**100**	**100**	**40**	**20**	**15**	**15**	**10**	**100**	**300**
R. Blackwood ..	98	95	39	17	14	12	9	91	284
W. E. Dahlenburg	99	96	36	18	13	13	8	88	283
C. F. H. Reichelt	97	95	34	17	14	13	8	86	278
Peter Bone, jun.	87	93	34	18	14	12	8	86	266
C. H. Roediger ..	87	86	32	16	11	13	8	80	253
Johan Reichelt ..	76	94	32	17	13	11	7	80	250
Crouch Bros. ..	90	With	drawn,	1921.					

Mr. Blackwood's crop totalled 255 acres, consisting of Federation, 145 acres; Penny, 55 acres; Dollar, 40 acres; and Graham, 15 acres. This had all been sown on summer fallow, which had been ploughed from 4½ to 5 inches deep in February and March. It was scarified 3 inches deep in June, and spring-toothed across in September, and again in October. It was harrowed after rain in November, and left till seeding time. Details of the cropping of 115 acres have been given in Section 1. Part of the remainder was scarified at the latter end of May, and crossed with the combine about the middle of June, sowing 75 lbs. of seed, and 112 lbs. of manure per acre. The balance was put in similarly three weeks later. It was all harrowed a day or two after sowing. The remarks on Mr. Blackwood's crop in Section 1 apply to the whole area, which can truly be described as magnificent.

Mr. Dahlenburg's crop was 217 acres, the whole of which was exceedingly fine, excepting a red loamy hill of 35 acres, where the crop was light, due to the nature of the soil. Wimmera Rye Grass seed had been sown here with the wheat, and this paddock is intended to be used solely as pastures in the future. The bulk of the crop was Federation, the remainder being 30 acres of Dollar. The latter, very even and dense, was a very attractive crop. The Federation was equally good, but hardly as even, owing to a number of light patches.

The Dollar was sown at the rate of 80 lbs. of seed and 120 lbs. of manure per acre, and the Federation with from 75 to 80 lbs. of seed and 112 lbs. of manure.

Mr. C. F. Reichelt's crop was sown on three classes of land:—Heavy black soil, fringe, and Mallee. The Mallee crop has been discussed in Section 2. On the heavy land, Federation and Dollar had been sown, and on the fringe country Federation and Gallipoli. This land had been winteer-fallowed, and had received six workings before harvest. Sowing was made with the combine at the latter end of June, harrowing both in front and behind. Seventy pounds of seed and 80 lbs. of manure were sown per acre.

The seed is changed each year from the Mallee to the black land, and *vice versâ*. Mr. Reichelt believes in deep sowing, 2½ inches if possible, as he considers a more even germination can be obtained in this way than by shallow sowing. The crops on the black land and the Mallee fringe were dense and even. The Gallipoli on the latter was very thick, and rather taller in the straw than is usual for this variety. It promised a heavy yield of grain, however.

Section 9.—For Stiff Red Land—Friable Red Loams Debarred.

Prize to be awarded for the highest aggregate of points for 75 acres of fallow 1921, and the crop on that fallow 1922. Points up to 5 per cent. of the total marks each year to be deducted, if necessary, if the red land contains fertile patches.

There were four competitors:—Messrs. Johan Reichelt, C. P. Dahlenburg, Julus Reichelt, and C. F. Reichelt. The entries of Messrs. Julus and C. F. Reichelt were withdrawn, as the soil, in both cases, did not comply with the rules in this section.

Mr. Julus Reichelt's fallow was a friable red soil, while Mr. C. F. Reichelt's was a red sandy soil, with occasional stiff patches.

Name.	Moisture.	Mulch.	Freedom from Weeds.	Cultivation.	Total.
Maximum Points ...	**25**	**25**	**25**	**25**	**100**
C. P. Dahlenburg ...	25	18	24	20	87
Johan Reichelt	25	17	22	22	86

Mr. Dahlenburg wins in this section. A detailed working of this fallow appears in Section 4.

Mr. Reichelt's fallow was more crab-holey than that of Mr. Dahlenburg, and thus was more difficult to work. During the winter Mr. Reichelt was unable to plough, as the crab-holes were filled with water. As spring approached, the banks commenced to dry out and set hard before the water in the depressions had got away. Ploughing was done during September with water still in many of the crab-holes, and some of the banks already in a cementy condition. It was harrowed twice immedately after ploughing—spring-toothed early in October.

harrowed and rolled a fortnight later. It was then harrowed, spring-toothed, and again harrowed—the worst half was rolled again, and then all harrowed. Since ploughing, this fallow had been given ten workings, and even then a number of patches were not broken down.

The obvious solution is levelling, but here there are difficulties to contend with. The nature of the soil makes is unsuitable for working with a leveller, while the depth of surface soil varies from 2 to 7 inches. Beneath this, a stiff clay is invariably met with, and it is considered detrimental to bring this to the surface. Hence, it is apparent that, on this class of land, only after some years of cultivation will it become sufficiently levelled by the workings of the implements to insure the main factor for success—"a quick ploughing at the opportune time."

Section 10.—For Returned Soldiers.

Aggregate of points for best fallow of 75 acres 1921, and crop on that fallow 1922.

Restricted to soldiers within the Lowan Shire, or within a 15-miles radius of Nhill if out of the Shire.

Fallow 1921.

Name.	Moisture.	Mulch.	Freedom from Weeds.	Consolidation.	Cultivation.	Total.
Maximum Points	**20**	**20**	**20**	**20**	**20**	**100**
C. J. Creek	20	19	19	18	19	95
W. F. Beacom	20	17	20	18	19	94
Gordon Bone	20	18	18	19	18	93
H. V. Eastick	20	17	18	17	18	90
F. H. Eastick	20	18	16	17	18	89
C. J. Smith	20	17	14	18	16	85
E. H. Maynard	20	13	18	18	16	85
C. J. Beacom	20	13	17	17	17	84

The winner this season was Mr. C. J. Creek, who exhibited a very fine fallow. It was on a heavy black flat, and had been summer-fallowed in March, and scarified in July. Half was then harrowed, and all was harrowed early in August. It was worked with the combine early in September, harrowed at the end of October, and again at the latter end of November. The surface was in a fine tilth, very free from weeds, the few present being young paddy melons recently germinated. The consolidation underneath was good, and fairly even, and the general condition was that mellow state which is attained only by using the right implement at the right time.

Mr. W. F. Beacom's fallow was on medium strong mallee soil. It had been ploughed in August, and harrowed immediately, spring-toothed in October, and again after heavy rain during the first week of December. This fallow had been brought into good condition for this class of soil. An effective mulch had been formed without breaking the soil

down too finely. Thistles had all been cut, and other weeds were entirely absent.

Mr. Gordon Bone's fallow was also a very good one.

Time of Sowing on Black Soil.

A glance over the details of seeding operations of the various crops shows that sowing commenced during the last week of May, and was practically all completed by the end of June. This is a contrast to the time of sowing on the Wimmera Plains, where sowing was not generally finished till the latter end of July.

On some of the lower black flats there is a danger, in a wet season, of the ground becoming too wet if sowing is delayed, but to the majority of the black land of the district this does not apply; and, provided that it proves profitable, there is nothing to prevent the later sowing, similar to that now generally practised on the "Plains." Here, fourteen years ago, sowing was religiously commenced about the middle of May. Gradually, however, the operation was delayed year by year, till, at the present time, sowing does not generally commence till mid-June, and is not finished till the latter end of July. It has been definitely proved on the heavy black soil at Longerenong College that plots sown during the third week of July yield, on an average over a number of years, several bushels per acre more than plots sown at the end of May, or during the first week of June.

During July, 1918, there was a long spell of wet weather, and sowing was so delayed that the last of the field areas at the College was not put in till the 20th August. On the last two days, 30 acres of Bunyip wheat were sown. This yielded 36 bushels per acre, and was the heaviest crop of that variety that has been grown at the College.

The increased yield resulting from late sowing is directly attributed to two main factors—

(*a*) An extra scarifying at a critical time.

(*b*) A shorter growing period.

(*a*) The extra scarifying at this time of the year has more importance than one would casually attach to another working of the fallow. After the autumn rains, which are usually expected at the latter end of May, the weeds germinate on the follow; these are effectively dealt with by scarifying, but it is after this working that weeds germinate more readily. When this second growth of weeds has come away, the fallow is cross-scarified and drilled, or both operations are carried out simultaneously with the combine, and a harrowing is usually given a day or two behind the drill. As well as dealing effectively with weeds, and insuring a clean crop, the double working at this time of the year, with plenty of moisture in the soil, probably stimulates the germination of spores of Take-All and Flag Smut, which die in the absence of the young wheat plants.

(*b*) The shorter growing period results in a shorter crop. There is always a danger of an early-sown crop making rank growth, especially if heavy quantities of seed and manure have been sown; but the late-sown crop, with its shorter straw, can be both heavily seeded and manured. The resulting crop will be well headed and dense, and it is to this degree of density that the increased yield is mainly due. The

short crop stands well at harvest time, and is easily taken off, whereas a rank crop goes down easily, and even though modern machinery may take it off successfully, it is a source of much trouble and loss of time in harvesting.

In a district where so many fine crops were found, it was rather surprising to find so few which were not affected with smut in a more or less degree. The seed of all the crops exhibited had been pickled with either bluestone or formalin. Either of these pickles is thoroughly effective, provided that the operation is done carefully. There is no advantage in using a pickle above the correct strength (1½ lbs. of bluestone to 10 gallons of water, or 1 lb. of formalin to 40 gallons of water), and, indeed, this practice only injures the seed to no purpose.

In order to kill the smut spores, it is necessary that they be saturated with the pickling solution. Where the seed is pickled in butts, it occasionally happens that some of the balls are still intact, and the solution does not penetrate to the centre. The butts are tossed about in carting to the paddocks, the outer spores on these balls are rubbed off, leaving those exposed which had not come in contact with the pickle. Many grains are thus re-infected from this source. A point which some competitors omitted was to pickle the bags also. This is a common source of re-infection. As the bags are being filled in the harvest field, the smut balls, being lighter than the grain, run to the outside of the bag, where they become broken in handling, and are held on the inside of the bag. If the crop the previous year has been badly infected with smut, it is a wise precaution to disinfect the drill with formalin solution.

Since the smut balls are lighter than the pickle, the surest method of pickling is obviously that of pouring the seed into the solution. This allows all the smut balls to rise to the surface, when they can be skimmed off. There are several pickling machines on the market specially designed for this method.

In conclusion, I would like to thank the officers of the society, particularly the Secretary, Mr. C. H. Towns, for the excellent and thoughtful arrangements made in connexion with the judging, and to express my appreciation to the competitors, who so warmly extended their hospitality.

Any man starting in the dairy cattle business cannot afford to purchase anything but a good pure-bred sire. His breeding herd soon comes to the level of the bulls he uses rather than of the dams or foundation cows. Only 6¼ per cent. of the blood of the foundation cows remains in the herd after the third generation. He can better afford to go wrong purchasing his entire herd of foundation cows than to go wrong in selecting his herd bull. A poor cow transmits her characteristics to only one individual each year, while the bull influences a large number. Poor production in a cow may be found out in a year, and often less, but low production in a bull cannot be detected until his daughters are in milk, and by that time he has transmitted undesirable characteristics to several crops of calves.—*Seasonable Hints,* issued by the Canadian Department of Agriculture.

WEEDS AND THEIR ERADICATION.

By H. W. Davey, F.E.S., Orchard Supervision Branch, Department of Agriculture.

(Continued from page 18.)

Ragwort. *Senecio Jacobæa*, L., Asteraceae.

This perennial plant is an introduction from Europe, where it is said to fancy light, chalky land. In Victoria, it thrives best on good strong soils, being especially vigorous on river flats.

Fig. 24.—Ragwort. *S. Jacobæa*, L.
Plant and Flower Stem.

Ragwort belongs to the same genus of plants as the common Grounsel, *S. vulgaris*, so much in favour with many small cage birds, and like that plant produces a great number of wind-borne seeds.

S. Jacobæa has a very distinctive appearance, which makes it easy to recognise, in spite of the fact that its leaves are subject to great variation in shape. In typical plants, the leaves are large, of a dark-green colour, and so irregularly cut that they give the plant its ragged appearance. (Fig. 24.)

This species varies greatly in height, ranging from 2 to 6 feet. The writer recently measured specimens that reached 6 ft. 2 in., but these were found growing among heavy bracken on the banks of the Upper Barwon River, near Forrest. From 2 to 4 feet, however, appears to be the average height of this plant. The flower heads are golden-yellow, about 1 inch in diameter, and are grouped in large, flat-topped clusters. They are probably at their best during January and February.

Ragwort has a fleshy tap-root, with a few thick root-stocks and fibrous roots attached. When green, it has often such a disagreeable odour that in some parts of England it goes by the name of "Stinking Willie." This plant is proclaimed under the Victorian Thistle Act for the whole of Victoria, and no opportunity should be missed to destroy so useless a weed, and one that is the cause of a fatal disease in cattle and horses.

In *A Manual of Weeds*, by Ada E. Georgia, America, the following reference to *S. Jacobæa* appears:—

> "When eaten by cattle it causes a fatal disease of the liver (*Hepatic cirrhosis*), locally known as Pictou Disease, which, for many years, was supposed to be contagious because of the fact that whole herds were often affected at the same time. But long investigation, and a series of careful experiments made under the direction of the Veterinary Director-General of the Dominion of Canada, have proved that this weed is the cause of the trouble. The Molteno Cattle Disease of South Africa is similar, and is due to the same cause. When green, the whole plant emits a most disagreeable fetid odour, and is disliked by grazing animals; but when dried in hay, it is freely eaten by all kinds of stock, and is then a serious danger. Plants that are harvested and cured just before coming into bloom are said to be at their most noxious stage."

In the control of this plant, there is a lot of evidence to show that the pasturing of sheep on Ragwort-infested areas will go a very long way towards the eradication of this weed. Sheep are very partial to the young plants, and can be utilized for feeding these off. They should not be kept too long at a time on infested land, but should be given a change to good grass, though, unless the infestation be very bad, there will usually be sufficient grass to counteract any bad effects the plant might have on the sheep.

Cultivation will easily suppress ragwort, but where this cannot be practised, the plants should be hand-pulled, and burnt before there is any opportunity for the seeds to ripen.

Bristly Ox Tongue. *Picris echioides*, L., Asteraceae.

This coarse annual or biennial weed, Fig. 25, is a native of Europe, Asia, and Africa. It is becoming much too common in Victoria on cultivated lands, and on made up land, such as railway embankments, &c. Its seeds are wind-borne, which has enabled it to become very

widely spread. It is not poisonous. Its prickly, hairy foliage and yellow flowers have such a bitter taste that stock will not eat it. Cultivation should easily suppress this plant; and on land that cannot be cultivated no opportunity should be neglected of hoeing it out before its seed has any chance of ripening and being dispersed by the wind.

Fig. 25.—Bristly Ox Tongue. *Picris echioides*, L.

Poison Hemlock. *Conium maculatum*, L., Umbelliferae.

Often growing to a height of 7 feet or more, this very poisonous plant has now a very wide range. It delights in moist situations, or in districts having a good rainfall. Hemlock has several names given to it, but probably it is best known as the "Carrot Fern." (Fig. 26.)

It is a very strong-growing, biennial species, and is a much-branched, graceful plant; its elegant leaves are divided into many segments, and this gives them a fern-like appearance. (Fig. 27.)

The strong, polished and light-coloured stem is purple-spotted. Its small white flowers are exceedingly numerous in terminal clusters, and

Fig. 26.—Stem of Carrot Fern. *Conium maculatum*, L.

make the plant a conspicuous object during the spring and early summer months.

It is said to have been a species of hemlock which furnished the "Cup of Death" drunk by the condemned philosopher Socrates in Ancient Athens; but the *Conium* of the Greeks is supposed by some

authorities to have been obtained from the roots of the Water Hemlock, *Cicuta virosa,* L., which is very poisonous.

All parts of the hemlock now naturalized in Victoria are poisonous, and stock have often suffered through eating the plant, and in some instances children have been poisoned in the same way.

Hemlock is usually found growing on the banks of creeks and river flats, also on road-sides in moist situations, as it is a moisture-loving species. When growing in the former situations, it is usually so strongly rooted as to render hand-pulling impossible, so that grubbing it out

Fig 27.—Carrot Fern Leaf.

becomes necessary. First-year plants and older ones growing on road-sides can usually be hand-pulled or hoed out without much difficulty. They should be gathered together soon after pulling, and piled on brushwood and burnt, so as to prevent a chance of any of the plants maturing seed.

Where a number of small plants are scattered about, they could be mown, and salt afterwards applied to the roots.

Poison Hemlock is proclaimed, under the Victorian Thistle Act, for the whole of Victoria.

(To be continued.)

STANDARD TEST COWS.

REPORT FOR QUARTER ENDED 31st DECEMBER, 1921.

During the quarter 99 cows completed the lactation term, 81 of the number qualifying for the certificate. Individual results are as follow:—

Owner.	No. completed.	No. Certificated.	Breed.	Name of Cow.	Herd Book No.	Calving Date.	Days in Test.	Milk last Day.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
								lbs.	lbs.		lbs.	lbs.	lbs.
Mrs. F. M. Akehurst, East Caulfield	2	2	Jersey ..	Violet 9th of Rocklee	Not yet allotted	2.2.21	273	10½	3,103	5·71	177·23	175	202¾
				Canary 11th of Kingsvale	7181	9.2.21	273	15	4,128	6·19	255·48	200	291½
C. Bamford, Benalla	4	4	Ayrshire ..	Rose of Medburn Grove	Not yet allotted	16.2.21	273	12	4,426	4·44	196·39	175	224
				Beauty of Medburn Grove	4858	15.3.21	273	9	6,432	4·14	266·32	200	303¾
				Linda of Medburn Grove	Not yet allotted	19.3.21	273	24	6,860	4·14	283·82	175	323½
				Bloomer of Medburn Grove	,,	27·3·21	273	14½	5,273	3·96	208·83	175	238
Mrs. Irene Beard, Outtrim	2	Nil	Jersey ..										
J. Benallock, Elliminyt	1	1	Ayrshire ..	Blanche of Woodbyrne	3314	13.1.21	273	21½	6,520	3·88	253·08	250	288½
Mrs. Agnes Black, Noorat	1	1	Jersey ..	Noorat Maurguerite	6413	21.3.21	273	16½	8,328	4·66	387·95	250	442½
Callery Brothers, Bannockburn	3	2	Ayrshire ..	Rose Royal of Langley Park	2841	4.1.21	273	16	7,654	4·25	325·30	250	370¾
				Roseleaf of Langley Park	4953	21.3.21	273	8½	5,799	4·94	286·33	200	326½

CERTIFICATED COWS—*continued.*

Owner.	No. completed.	No. Certificated.	Breed.	Name of Cow.	Herd Book No.	Calving Date.	Days in Test.	Milk last Day.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
								lbs.	lbs.		lbs.	lbs.	lbs.
J. W. Cochrane, Moorabbin	1	Nil	Ayrshire ..										
W. C. Greaves, Monomeith	6	6	Ayrshire ..	Verbena of Warrook	Not yet allotted	8.1.21	240	4	6,638	4·26	283·14	250	322¾
				Fairy of Warrook	5170	19.1.21	229	4	5,685	4·95	281·41	250	320¾
				Verona of Warrook	5174	23.1.21	259	8	7,297	4·11	299·91	250	342
				Trixie of Warrook	Not yet allotted	24.1.21	226	4	4,507	4.43	199.63	175	217
				Vanity of Warrook	2546	27.1.21	273	23	8,508	4·63	393·86	250	449
				Fuchsia of Warrook	2544	8.2.21	223	24	7,061	4·08	288·07	250	328½
T. Harvey, Boisdale	1	1	Jersey ..	Bluebell 2nd of Jerseyholm	6845	15.3.21	273	17½	7,507	5·57	419·26	200	478
J. H. Hunter, Tyntynder Central	3	3	Jersey ..	Rarity 11th of Melrose	6944	1.2.21	273	17½	7,096	5·67	402·61	200	459
				Chevy 12th of Melrose	6941	20.2.21	273	24	7,431	6·14	455·98	200	519¾
				Peerless of Meadow Vale	Not yet allotted	13.3.21	273	12½	4,345	6·25	271·77	175	309¾
J. Hutchinson, Somerville	1	1	Jersey ..	Audrey's Victress of Somerville	Not yet allotted	15.1.21	273	16½	4,585	5·25	241·79	175	275¾
A. Jackson, Glen Forbes	1	1	Jersey ..	Beauty's Daffodil of Lesterfield	Not yet allotted	22.1.11	273	14	4,255	4·89	208·10	200	237¼
S. A. Johnson, Woodend	1	1	Ayrshire ..	Bountiful of La Motte	5252	25.1.21	259	6½	6,895	4·54	312·88	250	356¾
A. W. Jones, Whittington, Geelong	5	4	Jersey ..	Butter Queen 2nd of Merynla	Not yet allotted	3.1.21	273	22½	5,531	5·28	292·05	175	333
				Wee Choice of Tarnpirr	7068	17.1.21	273	10	5,339	7·11	379·70	200	432¾
				Lady Grey 8th of St. Albans	4187	24.1.21	273	17½	8,710	4·70	409·13	250	466½
				Lady Grey 9th of St. Albans	6998	14.3.21	215	4	4,653	6·04	281·10	200	320½

Certificated Cows—*continued.*

Owner.	No. completed.	No. Certificated.	Breed.	Name of Cow.	Herd Book No.	Calving Date.	Days in Test.	Milk last Day.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
								lbs.	lbs.		lbs.	lbs.	lbs.
A. W. Jones, Whittington, Geelong	4	2	Friesian ..	Melba	Not yet allotted	23.2.21	271	12½	8,579	3·95	339·00	250	386½
				Bolobek Bess	,,	23.3.21	273	6	8,814	4·04	356·34	250	406¼
Kerr Brothers, Bacchus Marsh	5	5	Shorthorn ..	Morven Daphne 10th	Not yet allotted	7.2.21	273	14½	7,604	3·59	273·04	250	311¼
				Morven Pansy 8th	,,	9.2.21	273	8½	7,605	3·62	275·65	250	314¼
				Morven Pansy 7th	,,	28.2.21	273	27	8,923	4·04	360·12	250	410¾
				Morven Oxford Summerton	,,	19.3.21	273	19	7,289	3·98	290·23	250	330¾
				Morven Lizzie 10th	,,	23.3.21	273	17	7,107	3·54	251·41	250	286¼
R. Kerr, Boisdale ..	1	1	Friesian ..	Bolabek Bella	327	26.3.21	269	31	12,366	3·39	418·91	200	477¼
G. Keys, Hallam ..	2	2	Ayrshire ..	Ivy 2nd of Wethersdane	4160	7.1.21	273	13½	6,999	3·81	266·99	250	304¼
				Iris of Wethersdane	6481	10.1.21	273	15	6,003	4·20	252·39	200	287¼
A. Kirby, Daylesford	1	1	Jersey ..	Pride of Wattle Bank	5315	19.1.21	273	18½	6,110	4·45	272·12	200	310¼
J. A. Lang, Warrion	3	2	Ayrshire ..	Pansy 3rd of Riccarton	6,510	21.1.21	273	21	5,850	3·75	229·49	175	261¾
				Esme 2nd of Riccarton	6501	17.3.21	273	8½	6,243	3·65	227·75	200	259¾
Mrs. E. M. Lennie, Tongala	1	1	Jersey ..	Primrose 2nd of Bonshaw	7102	28.1.21	273	17½	5,936	5·23	310·21	250	353¼
Leslie and Gerrand, Sale	1	Nil	Ayrshire ..										

CERTIFICATED COWS—*continued.*

Owner.	No. completed.	No. Certificated.	Breed.	Name of Cow.	Herd Book No.	Calving Date.	Days in Test.	Milk last Day.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
								lbs.	lbs.		lbs.	lbs.	lbs.
C. D. Lloyd, Caulfield	1	1	.. ..	Werribee Northwood Madeira 6th ..	6540	3.2.21	273	22½	6,753	6·09	411·57	250	469¼
C. G. Lyon and R. R. Kerr, Heidelberg	7	7	Jersey ..	Mabel's Petal of Banyule	7122	20.1.21	273	20½	6,367	5·46	347·42	200	396
				Silvermine 20th of Banyule	7131	27.1.21	273	18	6,443	5·90	380·17	200	433½
				Woodruff Lady Monda	Not yet allotted	30.1.21	273	19	5,960	5·06	301·64	200	343½
				Molly 7th of Banyule	,,	19.2.21	273	20	7,241	4·65	336·40	175	383½
				Silvermine 21st of Banyule	,,	27.2.21	273	15	5,038	5·65	284·55	175	324½
				Mascotte of Banyule	,,	2.3.21	273	11	4,443	5·48	243·45	175	277½
				Mezzo of Banyule	,,	11.3.21	273	11	4,861	5·19	252·37	175	287½
C. W. W. Macauley, Rochester	1	1	Jersey ..	Honey of Wanalta	7164	15.3.21	273	17	5,428	4·95	268·74	175	306¼
L. McFarlane, Bundoora	3	3	Ayrshire ..	Lassie of Ayrbrae	6641	28.12.20	273	12½	5,797	4·18	242·08	175	276
				Heather Bell of Ayrbrae	Not yet allotted	17.1.21	271	12	6,492	4·32	281·45	175	321
				Heather of Winslade	,,	9.2.21	273	11½	5,217	4·83	251·91	200	287¼
W. Meredith, Ondit	1	1	Ayrshire ..	Lilian of Willow Vale	4650	2.3.21	273	17	7,180	4·14	297·60	250	339½
T. Mesley, Dalyston	2	2	Jersey ..	Gazelle 2nd of Warenda	6141	23.1.21	273	33	9,601	5·35	513·67	250	585½
				Tilly Lantry 2nd of Warenda	7198	6.3.21	171	19	4,300	6·08	261·53	200	366¼
Mrs. L. Orchard, Grahamvale	1	1	Jersey ..	Myrtle 2nd of Jersey Vale	7222	1.1.21	273	9½	3,657	5·55	202·96	200	231½
Miss Bruce Reid, Bundoora	4	2	Jersey ..	Jubilee Violet	Not yet allotted	7.1.21	273	7	3,513	5·72	200·98	200	229¼
				Retford Fawn	3056	3.3.21	273	7	5,215	5·32	278·45	250	317½

CERTIFICATED COWS—*continued.*

Owner.	No. completed.	No. Certificated.	Breed.	Name of Cow.	Herd Book No.	Calving Date.	Days in Test.	Milk last Day.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
								lbs.	lbs.		lbs.	lbs.	lbs.
J. Rogers, Yarraville	1	1	Ayrshire ..	Prunny of Golden Vein	2653	30.1.21	273	22	7,774	3·62	281·05	250	320½
G. Rowe, Kardella ..	2	2	Jersey ..	Rose of Welbourne	7398	10.1.21	273	9½	5,730	4·39	251·40	250	286½
				Pattie of Hillcrest	Not yet allotted	30.1.21	273	13½	4,192	4·93	206·70	175	235½
F. Sadler, Camperdown	3	2	Shorthorn ..	Rosetta 3rd	Not yet allotted	16.1.21	273	18½	7,582	4·15	314·97	250	359
				Pet of Hillcrest	,,	18.1.21	273	15½	5,016	4·66	233·44	175	266
Sadler Brothers, Noorat	5	4	Ayrshire ..	Greta of Burnbrae	6488	17.12.20	273	22	6,608	3·73	246·16	200	280½
				Butterfly of Burnbrae	5835	12.2.21	273	20	6,218	3·95	245·91	175	280½
				Ruby of Burnbrae	3085	3.3.21	273	19½	6,755	3·78	253·97	250	289½
				Brilliant 2nd of Kilmarnock	5850	21.3.21	273	26½	6,353	4·60	282·31	175	321½
A. H. S. Schier, Kernot	6	1	Ayrshire ..	Marguerite of Glengowrie	4632	23.2.21	273	20	6,193	4·53	280·37	250	319½
J. Scott, Chiltern ..	2	2	Jersey ..	Maitland's Petal	3338	9.1.21	273	24	6,319	5·44	343·44	250	391½
				Captor's Thora	3329	22.2.21	273	31	8,583	6·06	520·42	250	593¼
Mrs. E. Sims, Toolern Vale	1	1	Jersey ..	Royal Sun Ray	Not yet allotted	23.1.21	273	19	6,828	4·97	339·17	250	386½
O. J. Syme, Macedon	2	2	Friesian ..	Princess Ena	299	6.3.21	273	28½	10,619	3·50	371·09	250	423
				Domino Hengerveld Belle	307	22.3.21	273	29	11,448	3·63	415·09	250	473¼

CERTIFICATED COWS—*continued.*

Owner.	No. completed Test.	No. Certificated.	Breed.	Name of Cow.	Herd Book No.	Calving Date.	Days in Test.	Milk last Day of Test.	Milk.	Average Test.	Butter Fat.	Standard required.	Estimated Butter.
								lbs.	lbs.		lbs.	lbs.	lbs.
H. L. Webb, Sunbury	1	1	Ayrshire ..	Lily of Holly Green	4772	7.2.21	273	19½	8,327	4·69	390·61	200	445½
W. Woodmason, Oakleigh	6	6	Jersey ..	Jenny Lind 9th of Melrose	5543	22.12.20	273	19½	6,986	5·97	417·27	250	475⅔
				Graceful Duchess 11th of Melrose ..	4518	30.12.20	273	23½	6,728	6·17	415·07	250	473¼
				Graceful Duchess 19th of Melrose ..	7540	16.1.21	273	26½	6,296	6·42	403·98	200	460½
				Edith 6th of Melrose	7539	5·2·20	273	20	6,278	6·08	381·39	250	434⅔
				Pearl 2nd of Melrose	3670	8.3.21	273	12	5,973	5·40	322·44	250	367⅔
				Waverley Lass 3rd of Melrose	6312	27.3.21	273	16½	6,082	6·45	392·21	250	447

WORLD'S POULTRY CONGRESS.

A. V. D. Rintoul, N.D.D., Chief Poultry Expert.

The report of the first World's Poultry Congress, held at the Hague from 5th to 9th September, 1921, has now been received in Australia. The Congress originated with the International Association of Poultry Instructors, and had the official recognition of the Netherlands Government, with the patronage of H.M. the Queen of the Netherlands.

Some 400 delegates, including 130 from the United Kingdom, participated in the proceedings; New Zealand was represented by a gentleman who went at his own expense, and Australia was represented by an official from the High Commissioner's Office.

The papers submitted represented a summary of the knowledge of the civilized world (other than Australasia) in various phases of the poultry industry, and indicated a universal awakening as to the nutritive value of poultry and eggs, the economic importance and possibilities of the industry—not widely visualized—and the invaluable assistance that has been rendered to the industry by breeders of pure strains, and by scientists working towards combating disease.

It is earnestly to be hoped that at the next Poultry Congress, to be held in America in 1924, Australia will be amply represented and in a position to make clear some of the important factors in fecundity which may have been overlooked at the first Conference.

The first section of the Congress dealt with experiments, investigation, science of breeding, and its practical application.

The second section dealt with State and other official action, including reconstruction.

The third section dealt with hygiene and diseases.

The fourth section dealt with the training and necessary qualification of poultry instructors, education, and demonstrating work.

Egg Production of White Leghorns and White Wyandottes.

In the first section Major C. C. Hurst, in a lengthy paper, dealt with "The Genetics of Egg Production in White Leghorns and White Wyandottes, and its application to Poultry-breeding." Reference is made to Dr. Raymond Pearl's experiments, one of the features of which was the proof of the extreme value of the son of a heavy laying hen. Major Hurst concluded that, as a result of various experiments, early sexual maturity was a dominant factor, late sexual maturity being recessive. As regards winter production, fast laying was dominant, and slow laying recessive, which also applied to spring production. On the other hand, he considered that slow, or discontinuous autumn production was dominant to fast, or continuous, autumn production.

Broodiness was found to be dominant over non-broodiness (recessive).

Size of eggs, as represented by pullets in their first laying year, were graded into nine different grades, grade 1 being eggs 1½ ozs. to under 1⅝ ozs., each grade rising an eighth of an ounce in weight up to the ninth grade, which was for eggs 2½ ozs. and over. It was considered customary for a pullet to lay from five to seven different grades each year, the small egg being dominant, and the large egg recessive.

Egg Colour.—Brown eggs were considered dominant to white shelled eggs (recessive). The deepest colour was usually found in Rhode Island Reds, Cochins, and Langshans, classed as grade 5, whilst grade 4 represented the ordinary brown egg, grade 3 a light brown egg which might be termed the mode egg of White Wyandottes and Light Sussex, grade 2 a cream tinted white egg, the mode egg of Old English Game, and at times produced by White Wyandottes, Light Sussex, and White Leghorns. Grade I., an ivory tinted white, the mode egg of the White Leghorn, and Grade O, a pure chalky white, produced only by White Leghorns.

It was found that egg colour was much less variable in the individual hen than egg size. The individual Leghorn usually laid one or two grades only in the year.

Breeding for Egg Production.

The winter egg production was considered by far the most important. For high winter production two genetic factors were considered, *E* (early maturity) and *W* (fast laying); *e* (late maturity) and *w* (slow rate factors) are obviously not wanted, and any factors containing them must be discarded. Thus, to secure high winter layers, Early-Slow (Ew) and Late-Fast (eW) should be eliminated, and only Early-Fast (EW) retained; but Major Hurst discovered *four* kinds of Early-Fast (EW) birds, and not all will breed alike. They are Double-Early Double-Fast (EEWW), Single-Early Double-Fast (EeWW), Double-Early Single-Fast (EEWw), and Single-Early Single-Fast (EeWw). Of these, only EEWW is of any use for a permanent strain. Birds of this breed are not only high producers, but will breed high producers. The problem is to discover the EEWW pullets. As both factors were dominant, Major Hurst tested by mating with the double recessive eeww male, late maturer, slow layer. Where any late (ee) or slow (ww) birds came from this mating, the mother had to be discarded, but if all the daughters were early and fast, the mother was classed as EEWW. In these experiments a Cumberland strain of O.E. Game Cockerels, a strain noted for poor laying qualities, was used.

The objection in Australia to the foregoing method would be two-fold—first and foremost, the loss of a breeding season whilst experimenting with game cocks, and, secondly, the trouble of getting rid of the mongrel progeny.

Broodiness might be avoided by breeding only from non-broody hens.

Size of eggs presented greater difficulties because it was found that the "small" egg was dominant, consequently Cockerels should be only bred from habitually large-egg-hens for several generations.

The principal difficulty from which all British experimentalists seem to suffer is the extremely low record type of hen from which they appear to breed, the birds used averaging 195 eggs in their pullet year.

Australian experiments would therefore be of much greater value where large quantities of birds (260 to 280 test) can readily be obtained. The poorness of the British hens is emphasized in Major Hurst's interesting paper by the concluding paragraph:—"These experimental birds were reared under inferior conditions, and there is no doubt that

under *optimum* conditions *high* records would have been produced, probably averaging 225 instead of 195. Their dam's record was 215, and their sire's dam's record was 216." No Australian commercial egg farmer could keep going if he depended on 216 egg cockerels!

A paper, by Mr. J. Hammond, of School of Agriculture, Cambridge, dealt with recent research in animal production, covering ground with which the average up-to-date poultry farmer is more or less familiar, such as the inheritance of high production, the American pigmentation theory, variability in accordance with the season of the year and temperature as regards egg production, the time of year the pullets are hatched, broodiness, effect of exercise, duration of fertility after removal of male bird, &c.

Food Value of Eggs.

One of the best advertisements the egg, as an article of human diet, ever received, must have been the highly instructive paper by Professor Dryden, of the Oregon Agricultural College. As in my own opinion it cannot be too widely circulated, it is accordingly given verbatim:—

"The future prosperity of the poultry industry is dependent very largely upon an increased consumption of eggs and poultry. The consumption may be increased in two ways: First, by improving the quality of the eggs that are put on the market. More eggs are naturally eaten when they are fresh. The consumption would be enormously increased if consumers could always depend upon securing good, fresh, wholesome eggs, and any agency that will promote this end should receive the encouragement of poultry-breeders everywhere. If, on the other hand, consumers had a better understanding of the real value of eggs, the consumption would be very much greater.

"It seems from recent scientific investigation that the egg has only one real competitor in the world among the essential foods for human beings, and that is milk. The lowly cow and the humble hen carry the burden of the world, so far as it relates to the physical well-being of races. The use of eggs has saved the Chinese from extinction, and milk and eggs have been the factor in making the civilizations of Europe and America superior to that of the Orient, in the opinion of Dr. E. V. McCollum, who divides mankind into two groups on the basis of character of diet. On the one hand, the Chinese, Japanese, and the peoples of the tropics generally, and in the other class the peoples of Europe and America. The diet of the former has always been one of seeds, roots, tubers, meats (principally fish), and leafy vegetables. The Chinese eat more or less eggs, but there are no dairy products in China. On the other hand, Europeans and Americans are liberal eaters of both milk and eggs. According to Dr. McCollum, the result has been that the Chinaman is small, his span of life is short, infant mortality high, and they have never contributed anything new in invention or science or political system.

"In contrast are the peoples of Europe and America in normal times. They are the largest people in the world, have the lowest death-rate, the longest span of life, the lowest infant mortality, and they are the people who have become the great masters over the forces of nature, and have accomplished most in every line of activity. Dr. McCollum believes the difference is a matter of diet—physiological rather than racial.

"The difference in diet is that we have made use of all types of foodstuffs used by the peoples of the Orient; in addition, very liberal quantities of milk, and have used liberal quantities of eggs. Negroes and poor white people live on products from wheat flour, corn meal, rice, rolled oats, potatoes, or sweet potatoes, and meats. That diet undermines the constitution of these people, so that they become a prey to tuberculosis. Tuberculosis is not due primarily to faulty diet, but it is only contracted if the powers of resistance are sufficiently low.

"To show the effect of an egg diet in the prevention and cure of certain diseases, the work of Dr. Goldberger, of the Washington Health Service, is pointed out. He has studied pellagra, and arrived at the conclusion that this disease was due to faulty diet. He has cleared insane hospitals and orphan asylums absolutely free of this disease by liberal quantities of milk and eggs.

"Probably the most noteworthy result of these researches is that chemical analysis has failed to give us a correct understanding of the nutritive needs of animals, as well as human beings. The value of a food has been judged largely, if not wholly, by its protein content, and often by its heat units as determined by chemical analysis. From the newer nutrition it seems that chemical feed formulas have had their day. We know from actual feeding experiments that vegetable protein is not the same as animal protein, and did not produce the same result in egg yields. This fact, of tremendous importance to the human race, was given to the world as a result of observations and experiments with live-stock and poultry. Dr. McCollum proved that young animals would not grow when fed on wheat alone. The experiment was tried on rats and farm pigs. Scores of later experiments showed that a mixture of various seeds—corn, wheat, oats, peas, barley, rye—did not produce growth. Adding vegetable oil, almond oil, peanut oil, cottonseed oil did not make growth. But when butter fat or egg yolk fat were added, normal growth was obtained.

"Young rats, fed on purified proteins, carbohydrates, fats, and mineral salts did not live longer than when allowed to fast. Growth was secured when the fat in the food mixture was butter fat, and egg yolk fats were tried, and found to produce growth in the same manner as butter fat. The substance in butter fat responsible for this growth is as yet an undefined chemical substance, but has been called fat-soluble A. The purified egg yolk fats and butter fat would, however, only produce growth when fed in a ration containing another unknown substance, which has been called the water-soluble B. This substance is found in various seed plants, especially the leaf plants, and is also found in egg yolk and butter fat. When the fat has been removed, and then a water extract is made of the remaining egg yolk, the second substance, termed water-soluble B, is obtained.

"Both these substances are only found abundantly in eggs and milk.

"Human beings have been under the delusion that they were well fed because their diet contained a sufficient amount of protein, with proper heat value. Food values have hitherto been based on heat units or calories to the disadvantage of eggs. The newer knowledge of the science of nutrition has given the egg an importance in diet that

was never known before. With the backing of scientific research, the poultry interests may now organize a movement in the interest of the general welfare, as well as of the poultry industry, to make known to the world the real value of their product. It is safe to say that no food product receives less advertising than the egg. Newspapers, magazines, tram cars, and hoardings are all used to increase the popularity and sales of various food products. Huge sums are spent in advertising a brand of chewing gum or chocolates, soaps, tooth paste, a raisin, or a prune, but never a dollar to advertise the best and most nutritious food—with the possible exception of milk—ever given to man.

"Moreover, the egg is sometimes discounted by advertisers of other food products, and some of it is misleading. A baking powder company recently distributed pamphlets throughout the United States, gave 55 recipes for doing without eggs without a loss of food value, the substitute being their own baking powder.

"Poultry organizations might well take account of such advertising, not only for the sake of the industry, but in the interest of the public, which should be made to understand that there is no real substitute for eggs, and that such advertising is a blow at the health of the people."

Mendelism—the Industry and the Fancy.

Professor R. C. Punnett dealt with the above, stating that with regard to Father Mendel's original experiments with the culinary pea "his aims were purely scientific and impractical," the objective being not to improve the pea, but merely to know how certain characters behaved on cross-fertilization, whereas Dr. Pearl had arrived at definite practical results, viz., that the male is the important sex in transmitting the quality of high fecundity in the hen. Mendelism is really a name for the organized knowledge of the facts of breeding, and the practical application of the Mendelian laws for poultry farmers is to secure the greatest number of eggs at the least cost. Professor Punnett then referred to the vexed "cockerel" question in the following words:—"I gather that one of the troubles of those who rear pullets for egg production is that half of the chicks will insist upon being cockerels, and cockerels are rather a source of loss than otherwise, especially the cockerels of most of the best laying breeds. A large breeder once said that if he could wring the necks of all his cockerels on hatching he could see his way to profitable business. In no breed is it possible to tell with absolute certainty the sex of the chick at the time of hatching, while in some of the heavier breeds it may be many weeks before the sexes can be told apart. But why rear all the cockerels? There is no necessity whatever to do so, provided that the breeder takes advantage of recent Mendelian work. The sex-linked mode of transmission, already alluded to in connexion with the inheritance of fecundity, has been shown to hold good for certain characters which appear in the newly-hatched chick. A silver hen mated with a gold cock transmits the factor for silver to her sons, but not to her daughters. A barred hen mated with a black cock transmits the barred character to her sons, but not to her daughters, who are black. These colour distinctions are a sure guide to the sex of the chicken. They enable the breeder to refer the newly-hatched chick to its proper sex with absolute certainty."

Practical Australian poultry farmers will be amazed that such an extraordinary argument in favour of breeding mongrels could ever have been put forward seriously before a gathering of world's experts in poultry keeping. All the benefits of strain as regards egg production are swept aside in a few words to make way for mongrels!

These theories, however, put forward by Professor Punnett, fortunately can be very quickly disproved, as his claims are not absolutely correct in fact.

Some years ago, on a noted black Orpington farm in Victoria, a few pure-bred barred Plymouth Rock pullets were mated with a noted laying strain, Black Orpington male bird. Nearly all the resulting pullets were barred, some being so well barred, and with yellow legs, that they were sent to a laying competition (not Burnley) as pure-bred Rocks, passed muster as such, and averaged over 200 eggs each. Yet according to the professor, all the pullets must be black. One wonders why? That such a complete denial of Professor Punnett's work can be put forward is, to some extent, very unfortunate. It opens up an avenue of doubt with regard to other experiments that may be made. An experiment once or twice made on colour breeding does not by any means make uniform results a "natural law." Many years of work *on a large scale* are necessary before any dogmatic statement can be laid down.

Experimental work must also bear a direct relationship to the practical economics of the industry. Having evolved a laying strain of high fecundity, correct colour of shell, and proper size of egg, it would be the height of folly to throw all this away merely to be able, by cross-breeding, to try to determine the sex at hatching, instead of a few weeks later. How can the strain be carried on?

The man who can get a dozen or so first-class stud males reared each season is usually satisfied, even if the surplus and reject cockerels do not show much margin of profit.

(*To be continued.*)

THE BREEDING COCKERELS.

Many poultry-keepers, after selecting the most promising cockerels for future breeding purposes, place them in small coops or confined quarters. This is a mistake, as such conditions do not tend towards promoting vigorous and healthy growth. Confinement is necessary in fattening cockerels, but it is most undesirable in the case of those it is intended to breed from, it having the effect of over-forcing the birds, a common cause of leg-weakness and other troubles, such as falling combs, &c. In the building-up or maintenance of a heavy-laying strain the question of stamina in the male is of supreme importance. I therefore cannot suggest a better way of promoting this than by giving the growing bird a good range under the most natural conditions possible. Of course, this should go hand-in-hand with good breeding, housing, and general efficient management.—F. C. Brown, in *New Zealand Journal of Agriculture*, January, 1922.

SPRAYING EXPERIMENTS FOR BROWN ROT OF STONE FRUIT (SCLEROTINIA FRUCTIGENA).

Report by A. A. Hammond, Orchard Supervisor.

During last season, experiments were carried out at Messrs. Burgi Brothers' orchard at Seville to determine the best and cheapest spray for the control of Brown Rot, and also to ascertain the results of spraying at different times, and the advantages of three or four sprayings as compared with one or two. Much attention was given to the effect of the different spraying mixtures on the foliage and fruit, which is of particular importance, and valuable information was obtained.

The fungicides used were as under:—

(1) Bordeaux mixture 12–8–80, pre-blooming, and 3–9–50 and 3–3–50 and 3–3–40, for late sprayings.
(2) Woburn Bordeaux, that is, 13¾ gallons clear lime water, 1 lb. bluestone, made up to 80 gallons with fresh water.
(3) Acetate of copper, 1 lb. to 13 gallons water pre-blooming spray, and 10 ozs. to 40 gallons, and 15 ozs. to 40 gallons for late sprays.
(4) Lime sulphur, home made (boiled), 26 Baumé specific gravity 1.220, used 1 in 9, pre-blooming spray.
(5) Self-boiled lime sulphur 15–15–80, late spray.
(6) Sulphur sprays, including atomic sulphur (imported), atomised sulphur (Leggo's), and home-made sulphur wash, the latter being prepared with casein, skimmed milk and flour paste respectively.

One and a half gallons of lime sulphur 26 Baumé was added to the home-made sulphur and skimmed milk wash for cherries, and 1 gallon added to the same mixture for late spraying for peaches. Ten pounds of dry sulphur was used to 80 gallons in the home-made sulphur washes. An average of 2¾ gallons of mixture per tree was used. The trees were large, and it required this quantity of mixture to give them a thorough spraying.

The experiments were carried out on plum, peach, and cherry trees. In the plum block there were seventeen trees all of the Yellow Magnum Bonum variety except one, a young Grand Duke. The peach trees, forty in number, were Zerbe's No. 1, except for two Smith's Seedlings. The cherries were a mixed lot of twenty-five, comprising Burgdorf's Seedling, Twyford Biggareau, Napoleon Biggareau, White Heart, St. Marguerite, Florence, and Doncaster Seedling. In the numbers given check trees have not been included. All the trees treated were labelled and numbered, and particulars of treatment were recorded on the labels.

Check trees were left in each of the three plots. As one of each variety of cherry tree could not be set aside, it was decided to leave for check purposes three Burgdorf's Seedlings, a variety that was badly attacked by Brown Rot last season. This season, however, it was very free from the disease.

In addition to the spraying done on the experimental plots, different kinds and varieties of trees were treated in other parts of the orchard and notes taken of the results.

The plum and peach yields were very light; the cherries set a fair crop. Magnum Bonum plums and an early variety of peaches were chosen because these were badly affected in the previous season. Cherries were treated in order that experiments might be made with one of the fruits most susceptible to the Brown Rot.

It is doubtful whether the leaving of check trees in juxtaposition to sprayed ones is advisable when testing methods for suppression of such diseases as the Brown Rot Fungus. On the one hand diseased trees would infect clean trees growing near by, and on the other the effect of spraying sulphur washes in the vicinity, and clean culture would tend to keep the unsprayed trees cleaner. I may mention here that isolated peach, cherry, and plum trees which had not been treated were rather badly diseased, whereas check trees in juxtaposition to treated trees were not appreciably more diseased than those treated.

The whole of the orchard received several thorough sprayings during the present season (1921-22), with the exception of a few check and isolated trees already mentioned, consequently the disease was not nearly so bad as in the 1920-21 season. Most orchardists did some spraying this season as a protection against Brown Rot, whereas last season little or none was done. In a few neglected orchards the crop of cherries was practically destroyed, and the fungus was equally as bad as in the 1920-21 season.

Cultivation is not usually carried out by Messrs. Burgi Brothers until after the early spraying is completed, but this season at my suggestion the ploughing was done much earlier than usual, and was completed in most of the orchard before the trees were in full bloom. It is probable that this early ploughing helped to make the orchard generally much cleaner than it was during the previous season.

Sprayings were given to the experimental plots on the undermentioned dates:—

31 August (when all the trees, check trees included, received a pre-blooming spray).
12th, 18th, 26th, and 27th October.
9th and 29th November.
14th December.

The motor pump was used except in the case of a few trees which were sprayed with a hand pump.

The work of checking the infected fruit was done as accurately as possible in the circumstances. I was present when the cherries were picked, and slight infection could be detected on only a very careful examination. Mr. E. Burgi assisted me in checking the cherries, and as shown in the tables there was very little difference between the results of different sprays and the check trees in juxtaposition. As mentioned previously, there was a marked difference between treated trees and isolated trees where no spraying or cultivation had been done.

In the experiments with peaches and plums the work of checking infected fruits was comparatively easy. It will be noticed in Table 2 that no percentage of infected peaches is given. The reason for this omission is that during my absence about Christmas time the infected

fruit in the orchard was collected and destroyed. Owing to a mistake the peaches in the experimental plot were also collected. From my own observation and from inquiries made, I believe that there was no appreciable difference in the results of different sprays used and the number of applications given.

Messrs. Burgi Brothers were very reluctant to leave any trees unsprayed in the orchard. I can quite understand their anxiety concerning the check trees, as they suffered considerable loss from Brown Rot in the season 1920-21.

Sulphur sprays were given a fair test. These sprays are largely used in America to combat this disease. Atomic sulphur (American), atomised sulphur (Australian), and home-made sulphur wash were used side by side. No difference in the efficacy of the different sulphur sprays could be observed.

The home-made sulphur wash was prepared as follows:—Ten pounds of fine ground sulphur was run through a sieve for the purpose of breaking up small lumps, &c. This sulphur was wetted by slowly adding hot water and mixing thoroughly while at the consistency of stiff paste or bran-mash. (If made too thin the whole of the sulphur will not be properly wetted.) Casein solution was then added as a sticker and spreader. Casein solution is made by boiling 2½ gallons of water to which has previously been added 3 ozs. of Greenbank's caustic soda. When at the boil 20 ozs. of casein powder is sprinkled in, and the mixture is simmered for ten minutes. When cool it is bottled in 10-quart bottles. One quart of the solution is used to 80 gallons of sulphur spray. The efficacy of sulphur sprays for this disease has yet to be demonstrated. They do not adhere as well as lime sulphur or self-boiled lime sulphur. This applies particularly to smooth-skinned fruit such as cherries and plums. In the case of peaches and apricots, which have a hairy skin, it is different. An advantage of the sulphur sprays is that they are clean and safe, and may be used late in the season without fear of damaging the fruit in any way, while lime sulphur cannot be sprayed within five weeks of harvesting, otherwise the fruit, peaches particularly, will not become clean by the time they are ripening.

None of the spray mixtures did any injury to fruit or foliage excepting Bordeaux mixture on the peach trees. These trees were sprayed with Bordeaux at a strength of 3–3–50, 3–9–50, and 5–5–75. In all cases they got a set back, and stopped growing, and the fruit was discoloured on one side. However, they recovered, and did not cast their fruit. I have sprayed peaches in mid-December with the 3.9.50 Bordeaux without doing the slightest injury, and I attribute the injury done on the occasion under notice to following the Bordeaux spray with tobacco wash for Aphis about eight days later.

I have come to the conclusion from what I have observed this season that either Bordeaux or lime-sulphur (boiled) may be used for the first spray for all kinds of stone fruits except apricots. For later spraying I think the sulphur sprays should be used for peaches and apricots, and Bordeaux for cherries and plums. Smooth fruit, such as the latter, will not hold the sulphur, whereas the peaches and apricots will do so. With cherries, the first spraying should be given when, say, 10 per cent. of blossoms are open. Cherries are very susceptible when in bloom to infection by the Brown Rot fungus. From what I observed this

season I am convinced that the time when the first spraying was applied, viz., 31st August, was too early for cherries.

I think also that in the case of cherries the second spraying should be applied immediately after fruit sets. In regard to peaches and plums, the fungus, so far as I have observed, does not attack these fruits at the blossoming stage, or, if so, not to any appreciable extent.

All kinds of fruit seem to be very liable to infection at about ripening time, and sprayings should be given as late as possible consistent with uncontaminated and clean fruit at harvesting.

The right time to apply sprays is dependent on the weather. If there is a prospect of rain the spraying should be delayed as long as possible. It is better to spray trees when in full bloom than spray on the early side and run the risk of having the mixture washed off before the fungus appears.

As already mentioned, the Burgdorf's Seedling was badly affected in 1920-21 season, and comparatively free from disease in the season just past. The weather conditions at blooming and ripening periods would appear to be the cause of this. During the blooming period, 18th to 25th September, in 1920, the rainfall was for the eight days 232 points. In 1921 the rainfall for a similar period was 146 points. During the ripening period in 1920, viz., 9th to 16th November, the rainfall was 242 points, and for a similar period in 1921, 136 points. The mean temperature for eight days during blooming period in 1920 and 1921 respectively was 60.5 for the former and 62.7 for the latter; and the temperature for the periods when fruit of this variety is ripening was 72.3 in 1920, as compared with 77.3 in 1921. It will thus be seen the weather was drier and warmer in 1921, when this variety was in the most susceptible condition for infection—that is, during the time it is in bloom and when the fruit is ripening. A study of the rainfall and temperature at blooming and ripening times of all varieties show that the Brown Rot fungus is more dependent on weather conditions for development than is the case with any other orchard disease.

It will be noticed in the figures given below that the rainfall for the periods, 1st September to 15th January, in 1920-21 and 1921-22 seasons respectively, was heavier in the season when fungus was at its worst. The mean temperature, however, was practically the same for the periods under notice:—

Rainfall and Temperature for Seasons 1920-21 and 1921-22, 1st September to 15th January.

	1920–21.			1921–22.	
	Rainfall.	Mean Temp.		Rainfall.	Mean Temp.
	points.			points.	
Sept. ..	735	62.5	Sept. ..	388	65.3
Oct. ..	649	67.8	Oct. ..	550	66.2
Nov. ..	326	70.7	Nov. ..	361	73.0
Dec. ..	117	79.0	Dec. ..	171	74.0
Jan. (15 days)	285	78.9	Jan. (15 days)	305	78.7
	2,112	mean 71.7		1,775	mean 71.4

I am of opinion that the Brown Rot fungus will be most difficult to control by spraying in a wet season owing to the rapidity with which it fructifies and spreads. If, however, it is attacked in a season unfavorable to its development it could be eradicated. The lesson that growers have been taught during the past two seasons should cause them to make a special effort to cope with this disease when the conditions are unfavorable for it—that is, in normal and dry seasons when only a very small percentage of the fruit is affected. If the odd peach or plum seen a few years ago were destroyed as advised by officers of this branch the loss of thousands of pounds would have been avoided.

If experiments are continued next season I will make arrangements to secure a plot at Croydon. To obtain reliable data the experiments should extend over three seasons at least. From experience gained this season I advise the following treatment:—

(1) Remove all mummied fruit and with it infected wood when pruning, and, if practicable, burn same.
(2) Plough before infection time and turn in all diseased leaves, twigs, &c.
(3) Spray cherries with 12.8.80 Bordeaux when 10 per cent. of blooms have expanded, but later or earlier according to weather.
(4) Spray cherries again with 4.4.40 Bordeaux when fruit has set, and again with Woburn Bordeaux 14 days before ripening.
(5) Treat plums same as recommended for cherries.
(6) Spray peaches while at the pink stage with a full strength mixture of lime sulphur or Bordeaux.
(7) When husks are cast spray again with self-boiled lime sulphur, and again with sulphur spray thirty days before harvesting.

As to cost of the different spraying mixtures used, the home-made sulphur washes were the cheapest and the acetate of copper the dearest.

Excluding labour and fuel, the approximate cost of 80 gallons of the undermentioned sprays was as follows:—

	£	s.	d.
Home-made lime sulphur wash—26 Baumé ..	0	3	6
Self-boiled lime sulphur—15–15–80 formula ..	0	3	0
Sulphur wash and casein (home made)	0	1	10
Atomic sulphur (10 lbs. wetted sulphur used) ..	0	8	4
Atomised sulphur (10 lbs. wetted sulphur used) ..	0	8	4
Bordeaux mixture (full strength)—12–8–80 ..	0	6	0
Bordeaux mixture (half strength)—3–3–40 ..	0	3	0
Woburn Bordeaux	0	0	6
Acetate of copper—dormant spray	1	7	0
Acetate of copper—summer spray	0	9	0

It will be noticed in the table giving percentages of infected fruit that the acetate of copper was the least effective. Its cost, moreover, would make its use prohibitive. The lime sulphur used was made in accordance with the Department's formula, viz.:—Sulphur, 20 lbs.; fresh lime, 10 lbs.; water, 13 gallons. When boiled for 1 hour the stock

mixture is reduced to about 10 gallons. When tested with the hydrometer the solution was found to be 1.220 Spec. Gravity.

The quantity of water in gallons to add for dormant spraying is found by dividing the decimal portion of the Spec. Grav. by .028. For summer spraying the decimal portion is divided by .008.

For example, .220÷.028=8 nearly, and .220÷.008=27½, which represents the number of gallons of water for winter and summer spraying respectively to be added to stock mixture. In the experiments under notice the lime sulphur was not used after fruit set, except when added to the sulphur washes.

Table 1.

Plum Block-var-Magnum Bonum.

Tree Nos.		Remarks.	Percentage of infected fruits.
1	Bord., 12–8–80, 31st Aug.	Light crop	4
2	,, ,, ,, sulph. casein, 10 to 80, 11th Oct.	Very light	..
3	Lime sulph., 1–9, 31st Aug. ,, ,, ,,	Very light	..
4	,,	Light	..
5	Acet. of copper, 1 lb. to 13 gals., 31st Aug.	Light	..
6	Bord., 12–8–80, 31st Aug.	Medium	10
7	,, ,, ,,	Medium	4
8	Lime sulph., 1 in 9, 31st Aug.; sulph. casein, 10 lbs. to 80 gals., 11th Oct.	Light	1½
9	Acet. copper, 1 lb. in 13 gals., 31st Aug.	Light	3
10	Bord., 12–8–80, 31st Aug.	Medium	7
11	,, ,, ,, Bord., 3–3–40, 14th Dec.	Medium	..
12	Lime sulph., 1 in 9, 31st Aug. ,, ,, ,,	Medium	2
13	,, ,, ,,	Very small tree	..
14	Acet. copper, 1 lb. in 13 gals., 31st Aug.	Light crop	2
15	Sulph. casein, 10 lbs in 80 gals., 11th Oct.	Light ,,	1
16 and 17	Check trees, 5 per cent. infected		

Table 2.

Peach Block-var-Zerbe's, No. 1.

Sprays used and Time of Spraying.

Tree Nos.	
1.	Bord., 12–8–80, 31st Aug.
2.	,, ,, ,,
3.	,, ,, ,,
4.	,, ,, ,,
5.	,, ,, ,,
6.	,, ,, ,, Bord., 3–3–50, 12th Oct.
7.	,, ,, ,, ,, 3–9–50, ,,
8.	Bord., 12–8–80, 31st Aug.; atomic sulph., 10 lbs. to 80 gals., 29th Nov.
9.	,, ,, ,, ,, ,, ,, ,, ,,
10.	,, ,, ,, ,, ,, ,, ,, ,,
11.	,, ,, ,, ,, ,, ,, ,, ,,
12.	,, ,, ,, Bord., 3–3–50, 18th Oct.; atomic sulph, 10 lbs. to 80 gals., 29th Nov.
13.	,, ,, ,, Bord., 3–3–50 18th Oct; atomic sulph., 10 lbs. to 80 gals., 29th Nov.
14.	,, ,, ,, Bord., 3–3–50, 12th Oct.; atomic sulph., 10 lbs. to 80 gals., 29th Nov.

Table 2—*continued.*

Peach Block—*continued.*

15. Lime sulph., 1 in 9, 31st Aug.; self-boiled lime sulph., 27th Oct.; atomic sulph., 10 lbs. to 80 gals., 29th Nov.
16. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
17. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
18. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
19. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
20. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
21. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
22. Lime sulph, 1 in 9, 31st Aug.; self-boiled lime sulph., 27th Oct.; home-made sulphur wash plus 1 gal. lime sulph. 26 Baume, 29th Nov.
23. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
24. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
25. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
26. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
27. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
28. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
29. Acet. of copper, 1 lb. to 13 gals., 31st Aug; home-made sulphur wash plus 1 gal. lime sulph. 26 Baume, 29th Nov.
30. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
31. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
32. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
33. Acet. of copper, 1 lb. to 13 gals., 31st Aug.; acet. of copper, 10 ozs. to 40 gals., 18th Oct.; home-made sulphur wash plus 1 gal. lime sulph. 26 Baume, 29th Nov.
34. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
35. Acet. of copper, 1 lb. to 13 gals., 31st Aug.; atomised sulphur, 10 lbs. to 80 gals., 29th Nov.
36. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
37. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
38. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
39. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,
40. ,, ,, ,, ,, ,, ,, ,, ,, ,, ,,

The percentage of infected peaches cannot be given, as infected fruits were collected during Christmas holidays by Burgi Bros. The experimental plot infected fruit was collected in error.

Table 3.

Cherry Block.

Tree Nos.			Percentage infected.
1.	B.	Sprayed, Bordeaux, 12–8–80, 31st Aug.; Bord., 3–3–50, 12th Oct. ..	5
2.	Mar.	,, ,, ,, ,, ,, self-boiled L. S., 27th Oct.; Woburn, 29th Nov. ..	1
3.	W.H.	,, lime sulph., 1 in 9, 31st Aug.	3
4.	Mar.	,, ,, ,, ,, ,, self-boiled, 15–15–80, 27th Oct.; acet. copper, 29th Nov. ..	2
5.	Mar.	,, acet. of copper, 1 lb. to 13 gals., 31st Aug.	3
6.	Mar.	,, ,, ,, ,, ,, ,, ...	3
7.	Twy.	Unpruned. Bordeaux, 31st August; Bord., 3–3–50, 12th Oct.; Woburn, 9th Nov.	10
8.	T.	Pruned. ,, ,, ,, ,, ,, ,, ,,	8
9.	T.	Unpruned. Lime sulph, 31st Aug.; atomic sulph., 10 lbs. to 80, 12th Oct.	20
10.	T.	Pruned. ,, ,, ,, ,, ,, ,, ,,	14
11.	N.B.	Lime sulph., 31st Aug.; self-boiled, 26th Oct.	7
12.	B.	Acet, of copper, 31st Aug.; acet. cop., 10 ozs. to 40, 12th Oct. ..	20
13.	T.	Acet. of copper, 31st Aug.; acet. cop., 10 ozs. to 40, 12th Oct.; 15 ozs. to 40, 27th Oct.; 9th Nov.	18
14.	B.	Bordeaux, 31st Aug.; Bord., 3–3–50, 12th Oct.	8
15.	B.	Lime sulph., 31st Aug.; home-made sulph. and casein, 10 lbs. to 80, 12th Oct.	8
16.	B.	,, ,, ,, home-made as above, 12th Oct. and 27th Oct. ..	8

Table 3—*continued.*

Cherry Block—*continued.*

17.	B.	Bordeaux, 31st Aug.	10
18.	B.	,, ,,	10
19.	D.S.	,, ,,	10
20.	D.S.	,, ,,	10
21.	F.	Sprayed, Burgi Bros., three times; once lime sulph., and twice self-boiled, 15, 15 lbs. to 80 gals., last spray sulph. milk, 29th Nov.	10
22.	F.	Did not receive last spray	10
23.	Mar.	Sprayed as 21, and received sulph. milk spray, 29th Nov.	2
24.	M.	Did not receive last spray	8
25.	M.	Check tree not sprayed during season	18
		Burgdorp's (3) check trees	10 per cent.

The Bordeaux used pre-blossoming spray was in all cases 12–8–80 formula. The lime sulphur used was home-made 26 Baume. The self-boiled was 15–15–80 formula, and was prepared with *cold water.*

Abbreviations.

B., Bedford Prolific; F., Florence; T., Twyford; N.B., Napoleon Biggaram; D.S., Doncaster Seedling; Mar., Marguerite; Burg., Burgdorp's Seedling; W.H., Whit Heart.

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

Green Manures.

If a cover crop of leguminous plants is required for green manuring a start at planting may now be made. This can be done only when all the fruit has been gathered from the trees. An early crop is a distinct advantage. The cover crop should make a good growth before the winter sets in, as the plants make very little headway in the cold weather, and they require to be ploughed in as soon as the ground is dry enough in early spring. It will thus be seen that it is necessary to get a good autumn growth, as dense as possible, and one which will adequately cover the surface before winter.

Cultivation.

Should the weather remain hot and dry it will be very necessary to give the land surface a good stirring, so as to conserve water supplies. Where fruit crops have been gathered a start may be made late in the month with the autumn ploughing; whatever ploughing is done should be left as rough as possible.

Pests.

No codlin moth-affected or diseased fruit of any kind should be left on the ground after the crop has been gathered. These should all be destroyed by boiling.

All rust-affected foliage and fruit of plum and peach trees, as well as all other stone fruits that have been attacked by this and other fungus diseases, such as shot-hole, &c., should be burned if possible. This will minimize the possibility of future attacks.

The Vegetable Garden.

Autumn weeds must be kept out of the kitchen garden. These rapidly grow, and remain as robbers right through until the spring time.

The section should be well dug over for planting winter crops. Before digging a light sprinkling of bonedust and a good top dressing of stable manure should be spread on the surface. These may then be dug in, as they provide humus for the soil. Large plots should be avoided in winter; where such occur a path should be run down the centre. This will provide more efficient drainage. The beds, too, may be more raised than in the summer time.

Early onions may be planted out in the beds, and, if not already done, onion seed should be planted at once.

All classes of seedlings may be planted out, and seeds of lettuce, early peas, beet, carrots, radish, cabbage, cauliflower, and swede turnip may be sown.

Asparagus beds should be cleaned up and cut down as soon as the berries begin to colour. Celery rows should be kept earthed up: rhubarb beds should be given a dressing of manure to encourage the coming winter crop, and new rhubarb plantations may now be established.

The Flower Garden.

All classes of spring-flowering bulbs may now be planted. In bulb planting the bulbs should not come in contact with any manure. The manure should, some time previously, have been dug well in, and mixed with the soil, and all heat should have disappeared. If manure is required it should be placed below the bulb, so that the roots may ultimately penetrate to it. Bulbs thrive in sandy soils, and where the soil is heavy a little sand may be added to advantage. Bulbs should not be planted too deeply; the depth to plant is generally regulated by the size of the bulb. Such bulbs as freesias may be covered with only an inch of soil, while larger bulbs may be somewhat deeper.

The increasing prevalence of both bulb mite and rhizoctinia fungus in attacking bulbs makes it a matter of urgency that all bulb gardens and plots should be well dressed with lime before the bulbs are planted. The lime should be dug into the soil; and after the bulbs have been planted, a top-dressing should also be given. Each dressing need not exceed 2 ozs. per square yard. Clifts's manurial insecticide is also good.

Dahlias and chrysanthemums may be fed with liquid manure, or mulched with stable or poultry manure. In any case the feeding should not be too strong nor too frequent, and it should always be withheld before the flowers come.

All hardy annual, biennial, and perennial seeds may now be planted. Among these are dianthus, candytuft, sweet peas, Iceland poppies, anemone, ranunculus, stock, wallflower, columbine, foxglove, phlox, penstemon, pansy, gaillardia, &c.

Wherever aphis and red spider occur the plants should be sprayed with benzole emulsion, nicotine, pestend, or soaperine, or some other preventive in order to protect the coming flowers. Mildew attacks on the rose should be warded off by the use of sulphur. The sulphur may be either dusted on the plant or it may be scattered on the ground around and under the plant.

March is one of the best months for transplanting evergreen plants of all classes, trees, shrubs, and palms. The roots of the transplanted plants should be disturbed as little as possible, while the roots of those transplanted from pots should be well uncoiled and set out before planting.

The soil is now warm, and the roots will quickly take hold and grow. They are thus established for the winter, and will give little or no trouble in the subsequent summer heat and dryness.

In preparing the soil for planting the trees care should be taken not to dig small holes. A small hole is simply a "pot hole," in which the winter water accumulates, and as a result the young tree roots are rotted.

A large hole should be dug; or better still, the whole planting area should be well cultivated all over, and the plants or trees then set out in this cultivated area.

REMINDERS FOR APRIL.

LIVE STOCK.

Horses.—Those stabled should be fed liberally. Food of a more stimulating nature can now be given to get them well over the "changing coat" season. Those doing fast or heavy work should be clipped; if not wholly, then trace high. The legs should not be clipped. Those not rugged on coming into the stable at night sweating freely should be wiped down and in half-an-hour's time rugged or covered with bags until the coat is dry. Yearling colts if vigorous and well grown may be castrated. Weaned foals should have a little crushed oats daily, if available. Horses to be turned out during winter should not be clipped. Their mouths and feet should be examined and attended to where necessary.

Cattle.—As the nights become colder the dairy cows should be rugged. The rugs should be removed in day-time when the shade temperature reaches 60 degrees. If new grass is plentiful, give a ration of hay or straw, whole or chaffed, to counteract the purging effects of young grass. It will be found profitable to give a few pounds of bran, crushed oats or pollymeal in addition to other feed, to all cows giving a fair quantity of milk. Read article by Mr. B. A Barr, "Food Values and Rations," in *Journal* for September, 1916. Algerian oats should be sown on suitable land for grazing off in the winter. Sow a mixture of oats, rye, and tares or peas for winter fodder or to fill silos. Irrigated lucerne may be scarified in autumn, Algerian oats sown, and in this way good feed provided for cows in winter. Only exceptional cows or those required for city milk supply should be served between now and July. Within the next two or three months is the best time for cows to calve, as they will pay to feed through the winter, give the best returns for the season, and be dry when the feed is dry and at its worst. Calves should have lucerne hay or crushed oats when grass is not plentiful. Take care that salt lick previously recommended is available. One or two pounds of linseed cake or meal given daily should be found beneficial. In addition to its feed value, the oil in the cake or meal will counteract the effect of dry feed, which is liable to cause impaction.

Pigs.—Sows not already served should be put to the boar. Supply all pigs with plenty of bedding, and see that sties are warm and well ventilated. Supply sows liberally with grain. Castrate young boars as early as possible. Pigs

should be highly profitable now, as pork is very dear. Rape, barley (especially skinlesss), oats, &c., may be sown for grazing during winter. Crushed oats will be the most economical feed for pigs at present prices.

Sheep.—Merino and fine cross ewes, if mated early, will lamb from now on. Those in lamb to the larger British breeds of rams can be expected to give a certain amount of trouble in lambing.

Close attention should be given morning and evening to save every lamb possible, and pick up any ewes that may be cast. If the ewes are well-woolled sorts, they will need crutching, at the same time clear wool from around teats, and from the eyes. If the ewes are attentive mothers, any lambs that are found dead after these precautions, apart from weather conditions, foxes, &c., are just as well gone. Give purgative drenches at first sight of ewes appearing ill in any way. Give warm salad oil to any lambs that are dull in appearance. Ewes after difficult parturition or retention of after-birth can often be saved by flushing out with ½ oz. Lysol to 3 pints warm water. Reserve fresh pasture, or better still, sow a mixed green crop to turn ewes into later on, but not while carrying the lambs, this is too often injurious. On fine mornings when attending ewes, if feed is plentiful and ewes strong castrate as many ram lambs as possible, they are easily caught when two or three days old. Place them between the feet on the ground, no holder is necessary. In districts where conditions make second dipping a necessity, see that it is done before the weather becomes too unsettled.

Poultry.—Do not feed maize this month—soft food aids moult; add a teaspoonful of linseed to each bird's ration once daily. The more exercise the hens get the better they moult. Add to drinking water one packet of Epsom salts to twenty birds. Keep a sharp look out for chicken pox. Forward pullets should now be in their winter quarters, with plenty of scratching litter, and fed liberally—including ration of animal food. Grit, shell, and charcoal should always be available.

CULTIVATION.

Farm.—Dig potatoes as they mature. Cart out and spread stable manure. Finish preparation of land for main cereal crops. Sow Chou Moellier seed in beds for transplanting. Sow the following mixture per acre for green feed during the winter months for the dairy herd:—1½ bushels, Oats; ½ bushel, Cape Barley; ½ bushel, Tick Beans; ½ bushel, Pease. Sow Giant Drumhead Cabbage for transplanting (1 lb. sufficient for 1 acre, in rows 3 feet apart); provided the soil is in good friable condition, plants from seed sown last month should be planted out. Sow wheat and oats according to locality; also rape for winter feed or green manuring. Prepare clean seed-bed for lucerne; and sow Hunter River, Arabian, or Peruvian seed, free from dodder, in drills 7 inches apart and at the rate of 12-16 lbs. of seed per acre. Sow permanent pastures with grasses and clovers.

Vineyard.—Examine "Yema" grafts to see if strings require cutting. Consideration must be given to manuring; early application is strongly urged. Peas, &c., for green manuring should be sown as soon as possible.

Cellars.—Cleanliness is emphatically urged. Carefully remove all fermentable refuse—skins, lees, skimmings, &c. Such odds and ends favour multiplication of Vinegar Flies (*Drosophila funebris*). If present, destroy these with formalin or insecticide powders. A little bisulphite or sulphurous acid in washing water is recommended; also free use of lime on floors, &c.

Orchard.—Prepare land for planting; plough deeply and sub-soil. Plant legumes for green manure. Plant out strawberries. Clean up Codlin Moth from trees as soon as all fruit is gathered.

Flower Garden.—Plant out evergreen shrubs, trees, and Australian plants, divisions of herbaceous plants, seedlings, layers, and rooted cuttings. Feed chrysanthemums with liquid manure weekly until flowers begin to open. Prepare land for future plantings of roses and shrubs. Keep dahlias tied to stakes.

Vegetable Garden.—Plant out seedlings from the seed beds. Dig all vacant spaces roughly. Sow onions for early crop; also peas and broad beans. Clean out asparagus beds wherever the seeds are ripening.

NATIONAL MUSEUM, MELBOURNE

RAPE The Food for Sheep

SOW NOW FOR QUICK GREEN FEED

A Field of Giant Kangaroo Rape

RAPE is a profitable Winter crop, and is valuable for pasturing sheep during the Winter months.

A Great Fattening Food for Horses, Cows, Sheep, Pigs, &c.

Sow now, it will catch the Autumn rains, and will be ready for pasturing in about 10 weeks. A crop is thus available for stocking before the Winter sets in.

Somner's "Tip-Top" Giant Kangaroo Rape

A sturdy and rapid grower; it has a strong tap-root, enabling it to stand long periods of drought. Stalks break easily, and are very succulent right through. **Will not taint the milk.** Sow 4 to 6 lbs. per acre in drills; 8 to 12 lbs. broadcast. **Will fatten 3 more sheep per acre than any other kind. 1/- lb.; 93/4 cwt.**

Dwarf Essex **Imported English (true).** 10d. per lb.; 84/- per cwt.
New Zealand. 9d. per lb.; 74/8 per cwt.

Write for Special Circular on Rape.

LAW, SOMNER Pty. Ltd.

Established over 72 Years

Seed Merchants and Nurserymen
139-141 Swanston St., Melbourne

The leading Agricultural Seed House in Victoria

DEPARTMENT OF AGRICULTURE, VICTORIA

Red Poll Dairy Herd

The Department will shortly have completed the orders for calves that were booked ahead of calving when the advertisement was withdrawn; consequently the booking of orders for bull calves from the forthcoming calvings has now been resumed.

BULL CALVES are sold for delivery at a month old at prices based approximately on the actual milk and butter fat record of the dam at the rate of 1s. per lb. of butter ***fat*** yielded.

(For Record of Yields of dams see Red Poll Herd Book.)

The Bulls in Use include—

LONGFORD MAJOR (Imported)

Dam's Record 14713 lbs. milk ... 6 years average 11338 lbs. milk
G. Dam's ,, 10548 ,, ... 4 ,, ,, 9155 ,,

BELLIGERENT (Imported)

Dam's Record (1st milking) 7144 lbs. milk.

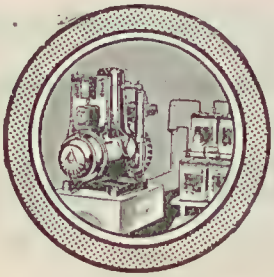
Dam's Dam's	,,	14533 lbs. milk	...	4 years	average	12871 lbs. milk
Sire's Dam's	,,	10370 ,,	...	7 ,,	,,	9354 ,,
Sire's D. Dam's	,,	9510 ,,	...	12 ,,	,,	8033 ,,
G. Sire's D. Dam's	,,	10215 ,,	...	7 ,,	,,	9386 ,,
G.G. Sire's D. Dam's	,,	12565 ,,	...	10 ,,	,,	8853 ,,
G.G.G. Sire's D. Dam's	,,	10088 ,,	...	2 ,,	,,	9754 ,,

Inspection of the Herd is Invited.

Visitors will be met at the Station on notifying the Manager, State Research Farm, Werribee.

Application for purchase to

Dr. S. S. CAMERON, DIRECTOR OF AGRICULTURE, MELBOURNE.



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Electricity for every farm

WHEN you buy a Delco-Light you buy a service that will last a life-time, a service that means endless saving in time, work, and worry. Delco-Light means that you can have electric light and power in every part of your home, farm, or store. Light in every room and barn, power enough to drive all the hand-driven machines on the farm, and at very low cost. Delco-Light is so simple a child can run it, it is absolutely self-contained, runs on kerosene, and there are 25 different sizes.

Delco-Light will drive the Sharples Moto-Milker

This wonderful portable two-cow milker is easily the best on the market. One man can milk a herd of 20 in 45 minutes. It is absolutely portable, and it is the one milker that has the compressed air squeeze; this gives rapid and easy milking, and the cows like it and give more milk.

Write for booklet and particulars

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(Melbourne) Limited

380 Bourke St. Melbourne

Illustration of the Sharples Moto-Milker in action.

☞ **Note the portability and ease of operation**

DEPARTMENT OF AGRICULTURE, VICTORIA

Pure Ayrshire Bulls

for Sale

STATE FARM, RUTHERGLEN

Royal Prince of Gowrie Park

Colour, Brown and White. *Calved 30th July, 1915*

Bred by Mr. W. P. Brisbane, Gowrie Park, Weerite, Victoria.

Pedigree.

Sire: Wallace of Gowrie Park (675) A.H.B. of A.
Dam: Princess of Gowrie Park (1710) by Heather of Jock 2nd (387)
2nd Dam: Princess 4th of Luminous of Oakbank (456)
3rd Dam: Young Princess by Dahlia's Adonis (172)
4th Dam: Princess by Young Norman (225)
5th Dam: Fancy by Earl of Seafield (422)
6th Dam: Princess by Norval.

Princess of Gowrie Park yielded 8,930¾ lbs. milk with a 4·67 test in 273 days.

COLLEGE PRINCE

Colour, Brown and White. *Calved 24th September, 1917*

Bred by Department of Agriculture at the State Farm, Rutherglen.

Sire: Royal Prince of Gowrie Park by Wallace of Gowrie Park (675) A.H.B. of A.
Dam: Irene 2nd of Flinders by Glen Elgin's Combine.
2nd Dam: Irene of Flinders by Gleneira's Monsieur (546)
3rd Dam: Irene of Gleneira (1727) by Majestic of Oakbank (326)
4th Dam: Isabel of Gleneira (1036) by Red Chief (359)
5th Dam: Gaiety (1006) by Dainty Davie.
6th Dam: Princess (270) by Prince.

Irene 2nd of Flinders yielded 570 gallons of milk with a 4·2 test in 304 days.

Inspection of these Bulls at the State Farm, Rutherglen, is invited

Application for purchase to

Dr. S. S. CAMERON, Director of Agriculture, Melbourne

KARSWOOD COW DRINKS

have been curing sick cattle for over thirty years

CATTLE were never so valuable as they are to-day. Most herds are far removed from veterinary assistance and the owners must rely on themselves or their herdsmen for that quick and certain treatment that may mean the life of a fine beast.

A KARSWOOD COW DRINK is the reliable first aid for sick cattle. It is a reliable purgative—compounded from an old original formula, in constant and successful use for over 30 years.

One very experienced cattleman says:—

"In nine out of every ten cases of sickness in cattle it is purging that will cure them . . . I could not describe all the cases where I have used it—they are too numerous . . . I give it to all ages, including calves—quantity according to age and size."

Another cattle-breeder, after many years of use, says:—"Find nothing to equal KARSWOOD COW DRINKS, especially in very urgent cases where quick purging is necessary."

CALVING TIME

Nowadays the high condition in which Dairy Cows are kept renders them liable to some risk at this period. Careless or inconsistent management frequently results in milk fever or cleansing troubles.

Best Method of Management

For three weeks before calving the cow should be kept on dry foods, and a Karswood Cow Drink given each week. After calving, she should be milked clean, and served with a pailful of thin, well-prepared, warm oatmeal gruel. For a few days she should have bran mashes, the water should be given warm, and she should be milked three times a day; served twelve hours after calving, a Karswood Cow Drink will clear the system, and for this purpose the Karswood Cow Drinks are held in very high repute by farmers who have used them for 50 years.

Price 1/6 per tin

If your own dealer cannot supply, send a postcard to the Importing Agents for your State (address below) asking the name of the nearest dealer who supplies KARSWOOD COW DRINKS.

Henry Berry & Co. Pty. Ltd.

Collins Street —— Melbourne

If supplied direct postage is charged extra.

PARSONS BROS. & CO.

Propy. Ltd.

OATMEAL, SPLIT PEAS, and
PEARL BARLEY MILLERS
and "CORNINA" MANUFACTURERS

ARE

BUYERS of OATS, PEAS, BARLEY, and MAIZE.

SEND SAMPLES OF YOUR GRAIN TO US.

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G.P.O., MELBOURNE.

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Up to two-thirds of valuation in sums from £50 to £2,000, repayable by instalments spread over a period of 25½ years. Interest 7 per cent. per annum.

Special Terms for Discharged Soldiers and Dependants, also those who were in **Red Cross** and **Transport Services,** up to three-fourths of valuation, repayable by instalments spread over a period of 28 years. Interest 6¾ per cent.

NO CHARGE FOR MORTGAGE DEED

Application forms obtainable at any Branch of the State Savings Bank.

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Head Office—Elizabeth Street, Melbourne

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Inspector-General

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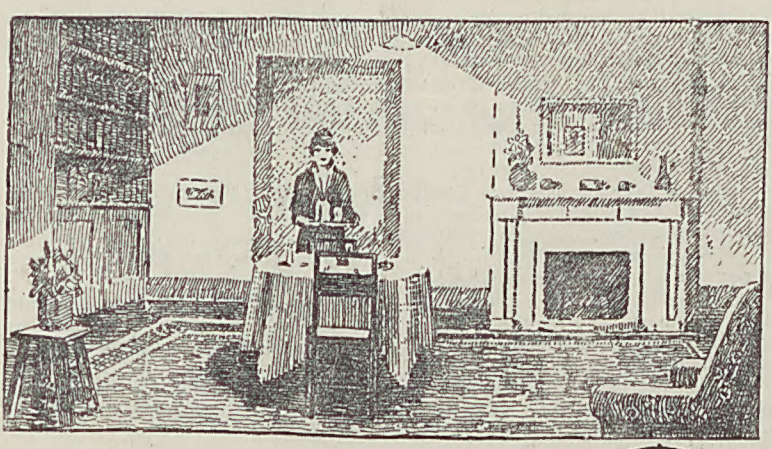
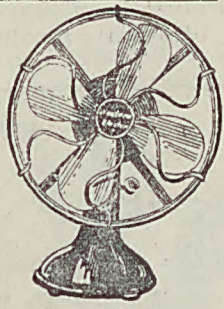
POWER and LIGHT
Makes the battery last longer

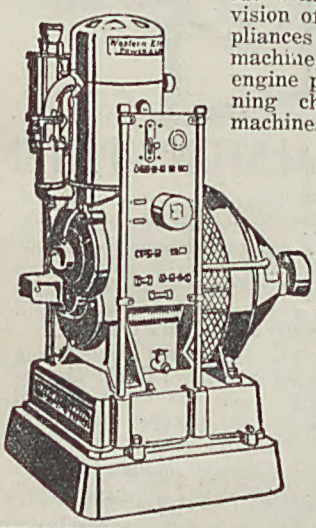


Makes a "City Home" of the Country House



The country-dweller who owns a Western Electric Power and Light Plant, makes his home not equal but superior in comfort and convenience to the city house.

It means the lighting of the house, inside and out with safe, odorless electric lamps; the provision of electric power to operate household appliances such as sewing machine, washing machine, electric iron, toaster, electric fan, etc.; engine power for doing regular farm work—running churn, separator, grindstone and other machines. Three splendid services from one plant.



You can buy small low price lighting plants, but they don't earn their cost—nor work so free from trouble as Western Electric Power and Light. You can learn in five minutes how to operate it—and it's easy to buy. Send for 20-page Descriptive Booklet (Post Free) from

C. R. FOSTER,
Western Electric Agent for Victoria,
262 Flinders Lane, Melbourne.

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TERRITORY OF NEW GUINEA

Vacancy for Director of Agriculture

Applications are invited for appointment as Director of Agriculture in the Territory of New Guinea, administered by the Commonwealth of Australia under mandate from the League of Nations.

The duties of the Director of Agriculture will be to advise on the agricultural development of New Guinea (both as to European-managed plantations and native gardens), to supervise scientific inquiries respecting plant diseases, soils, &c., and to control and manage, under the Administrator, the Agricultural Department of the Territory.

Applicants must have had a thorough training in the sciences underlying agriculture (honors degree preferred), and some experience of tropical agriculture (coconuts preferred). Age under 40 desirable.

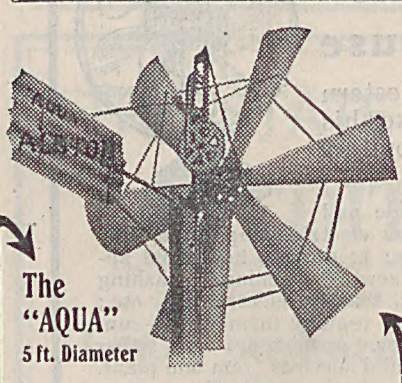
The appointment will be in the first instance for 5 years, with opportunity of renewal if services are satisfactory.

The salary will be not less than £1,000 per annum. Applicants should state the salary they require. There is no provision at present for pensions; but the successful candidate will enjoy any pension benefits applicable to the post which may hereafter be conferred.

First-class passage to Rabaul *via* Australia for appointee and family (not exceeding three adult fares) will be provided; and return passages if the appointee vacates his post at the end of five years.

Three months' leave will be granted in each two years of service.

Applications should be addressed to the Secretary, Prime Minister's Department, Melbourne, and should reach him not later than the 31st March, 1922.



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5 ft. Diameter

ALSTON WINDMILL

Price £8
With Fittings to attach to Wood Mast.

Just the machine to raise water for Household, Stock or Garden Supply. A soundly constructed small mill, fitted with Automatic Adjustable Speed Regulator, Adjustable Bearings, Screw Down Lubricators, etc.

Expert Advice and Catalogue Free on Application.

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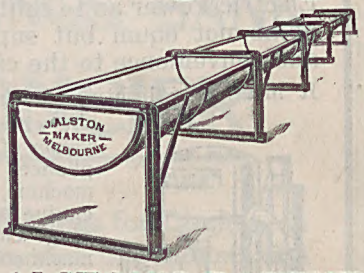
QUEEN'S BRIDGE, MELBOURNE

Troughing



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Steel throughout. Put together with a wrench, no solder required. Cannot leak or pull apart, because the Alston Patent Coupling makes a perfectly watertight joint without grooves to fracture the galvanizing while locking every section together as rigidly as a bridge.

The Heavy Steel Angle Frame and heavily Galvanized Steel Sheets used, together with our Patent Coupling, are points which make the ALSTON TROUGHING superior to all others.

Send for Illustrated Leaflet.

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First-Class Combination Week Tickets

covering Transport and Accommodation, at "The Government Chalet," are issued on Mondays by the 6.15 a.m. train, and on Fridays by the 4 p.m. Express train, at **£8 16/-**

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Opposite Town Hall, Collins Street, Melbourne

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Secretary for Railways.

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should be a paying commercial proposition.

SULPHATE OF AMMONIA

(the Fertilizer richest in Nitrogen) has placed many farms, orchards, and market gardens on a higher producing basis, and its use has become a practical necessity.

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is the influence that rejuvenates pastures, tones up heavily cultivated soils, and where orchard trees have become debilitated through heavy bearing, restores them to their former vigour and fruitfulness.

SULPHATE OF AMMONIA is easy to apply, is direct and immediate in its action, and is the richest of all known fertilizers in Nitrogen (the Staff of Plant Life).

Information as to the use of Sulphate of Ammonia and quotations for supplies, if not obtainable from local storekeepers, may be had on application to the following producers—

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